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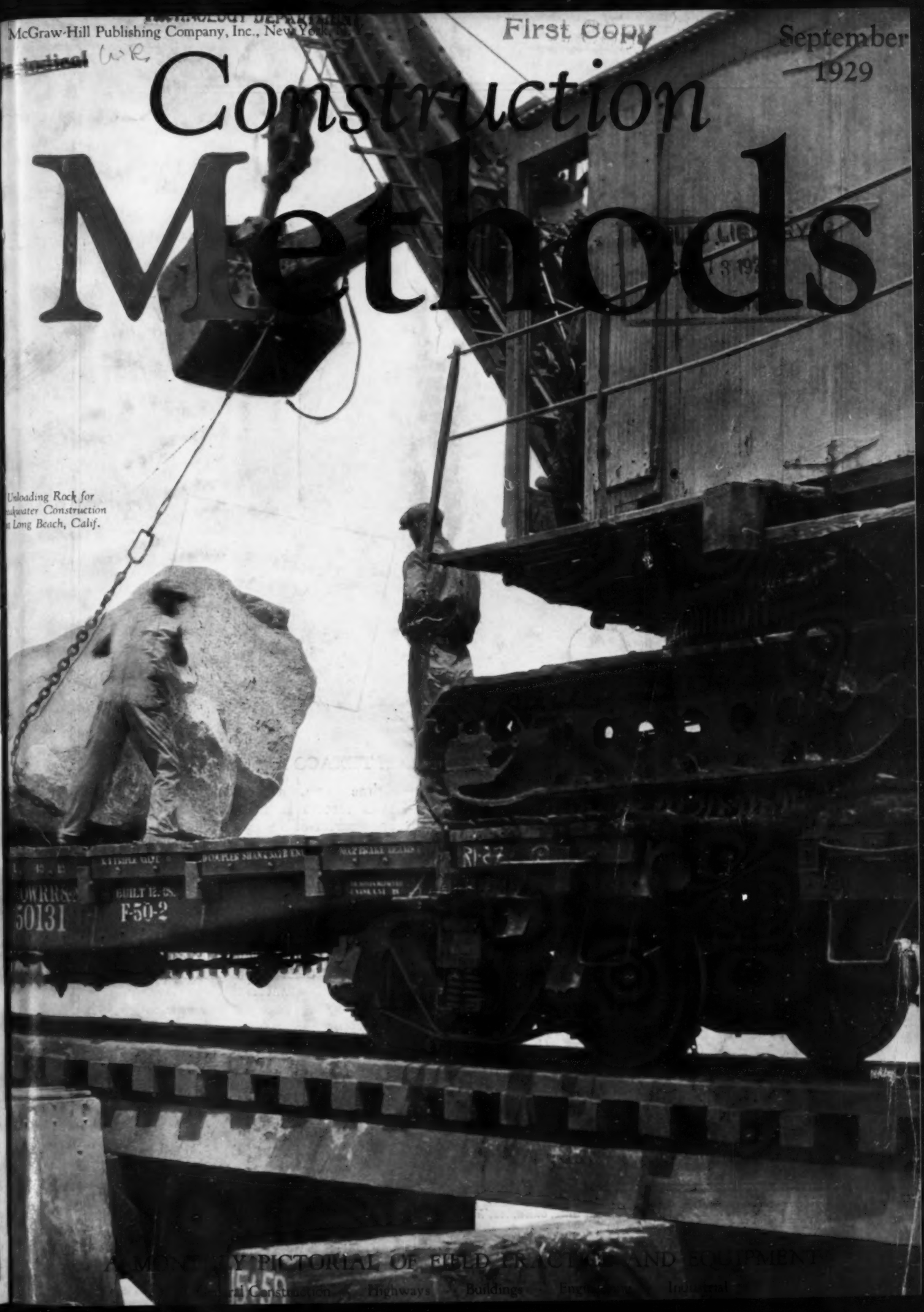
First Copy

September
1929

Construction Methods



Unloading Rock for Underwater Construction at Long Beach, Calif.

A MONTHLY PICTORIAL OF FIELD PRACTICE AND EQUIPMENT

General Construction · Highways · Buildings · Engineering · Industrial

Nineteen years have rolled by

Pavements of TEXACO Asphalt are still being laid in Topeka, Kansas.

Sixth Street Viaduct over Santa Fe and Missouri Pacific Railroad tracks, Topeka, Kansas. Paved with TEXACO Sheet Asphalt.

City officials and engineers will probably find the history of TEXACO Asphalt paving in Topeka, Kansas, interesting.

In 1910, this city constructed its first pavement with this material. Two years later, an additional yardage was laid, followed after another two years by a further increase.

Almost all of the succeeding years have witnessed the completion of new pavements of TEXACO Asphalt in Topeka.

Some time ago, the yardage of TEXACO streets in this city passed the three-quarter-of-a-million mark.

The resilient, durable and low-maintenance qualities of TEXACO Asphalt paving are thoroughly appreciated by this city—as well as by the hundreds of other municipalities throughout the United States, having streets constructed with this material.

TEXACO

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THE TEXAS COMPANY, U. S. A.
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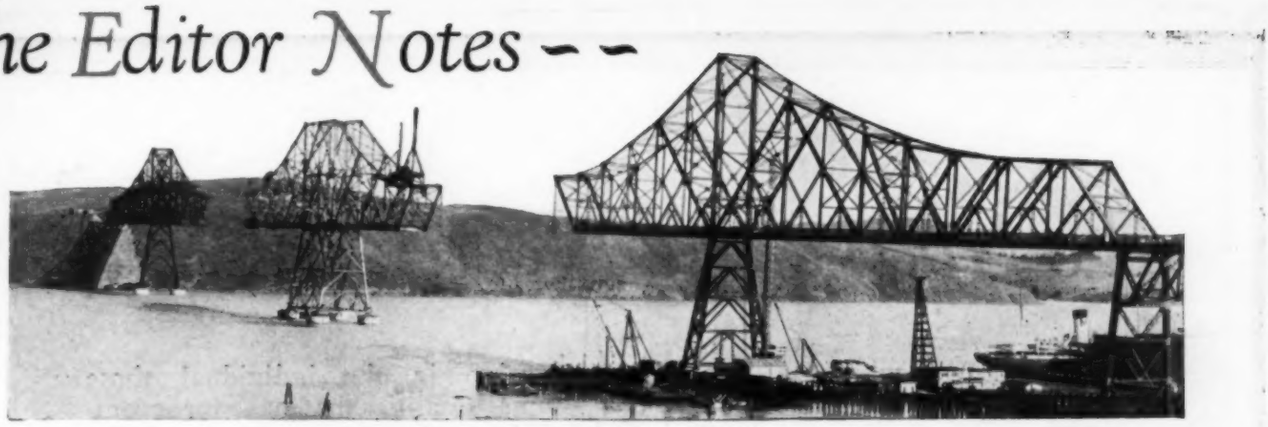
TECHNOLOGY DEPT.

The Editor Notes - -



Dams—Yesterday and Today

CONSTRUCTION practice in the building of dams has made notable progress in the last 25 years. The more important changes that have occurred in this period are summarized in the foreword to an illustrated pamphlet, "Dams and Control Works," issued by Commissioner Elwood Mead of the U. S. Bureau of Reclamation. Construction men will find it worth while to consider a few of the milestones that have been passed and the objectives reached by today's improvements in design and construction.

The older masonry dams, like the Roosevelt, begun in 1906, were built of rubble masonry containing from 60 to 70 per cent of stone laid up by hand with mortar and trowels. The upstream faces were cut stone with comparatively thin, well-pointed joints. The more modern type is of cyclopean concrete, containing a far smaller percentage of large stone (25 per cent or less), with the faces of the dam built of concrete laid against forms. In the most recent specifications the use of "plums," or derrick stone, is frequently abandoned altogether, the entire body of the dam consisting of concrete, with the addition of cobble rock to the mix in the more massive portions of the structure.

Who Gets Trimmed?

One of the largest items in construction costs is labor. A plentiful supply of modern tools and improved equipment insures from labor its maximum output. Speaking of the equipment for the shops of a municipal paving department a city engineer made this pertinent comment: "Unfortunately the shop of the smaller city is usually a mere hole or cave with a smattering of poor tools long since worn out. Too many city fathers are reluctant to improve these conditions, claiming they cannot afford to spend the amount needed for an up-to-date shop. This is a favorite item to trim when someone has the audacity to mention it in the budget. Officials who trim this expense are trimming the public, no matter how good their intentions may be."

CONSTRUCTION METHODS

A monthly review of modern construction practice and equipment

ROBERT K. TOMLIN, *Editor*

Editorial Staff

VINCENT B. SMITH NELLE FITZGERALD

J. I. BALLARD (San Francisco)

WILLARD CHEVALIER, *Publishing Director*

A McGraw-Hill Publication
Tenth Avenue at 36th Street, New York

One Way Out

A large stone quarry in Texas found difficulty in keeping men at work due to the extreme heat prevailing during most of the day. The management, in desperation, hit upon the idea of working nights instead of days. The men accepted the change and the plan proved successful. As this particular quarry was at a considerable distance from the nearest large town the problem of illumination at night was solved by portable outfits capable of lighting the work properly and at the same time requiring minimum maintenance expense. Acetylene flood-lights, common on general construction work, did the trick.

Safety Pictures Wanted

In this issue (pp. 40 and 41) are a number of illustrations showing how contractors are trying to prevent accidents on their jobs. Other safety pictures appeared in the July and August issues.

The Editor of *Construction Methods* wants additional pictures of how safety principles are *actually being applied*. Send along some photos from YOUR job.

Aid for Secondary Roads

A FEDERAL-AID law for secondary roads, supplementing existing legislation covering primary state routes, was recommended last month by Charles M. Upham, secretary-director of the American Road Builders' Association, in an address before the annual convention, in Savannah, Ga., of the National Rural Letter Carriers' Association. Among suggested provisions were: (1) Federal-aid funds for counties having organizations for administering and constructing highways. (2) Agreement on specifications by county and state. (3) Work to be carried on through the state in much the same manner as federal-aid state highways are now constructed. (4) Proportionate share of total expense for secondary highways to be divided among county, state and federal governments.

Easiest to Underwrite

The best classes of construction and those that are the easiest to underwrite, according to R. H. Towner, of the Towner Rating Bureau, are those that are highly mechanized, so that construction is almost all done by machinery with comparatively small payrolls. On jobs where the amount of machinery is small and the payrolls are large wages cannot always be accurately estimated in advance, due to the possibility of sharp increases before the contract is completed. Where job operations are largely mechanical, however, the underwriter's hazard is minimized.

Prequalification Defined

Prequalification of bidders on contracts, as defined by H. S. Sisson, executive secretary of the N. Y. State Highway Chapter of the A.G.C., is "merely an examination of an applicant's financial ability, equipment and experience in the construction of public improvements to determine if he is qualified to assume the obligations of contracting and to place the limit within which he can successfully operate."

To Spare the Needless Grief

TIME was when the "practical man" distrusted the printed word. To him books were the symbol of "theory" and therefore to be held in low esteem. The one teacher he honored was "experience"; the one school he respected was the "college of hard knocks."

Today all this is much changed. Modern business moves too swiftly, modern industry has become too complicated, modern science develops new materials, machinery and methods far too rapidly for any one man to keep abreast of progress through his day's work alone.

The truly practical man knows that to succeed he must command the aggregate experience of his industry rather than that alone of his individual activity.

To be sure, personal experience in the college of hard knocks is just as essential as ever it was—perhaps even more so. But its chief value is to develop in the individual those human qualities that make for accomplishment — self - confidence, judgment, initiative, courage, perception, energy and all the rest. Its special purpose is to develop manhood rather than to teach methods. No book ever can hope to render this vital service.

So the practical man in the construction industry has come to value *Construction Methods* as a helpful source of experience. It brings to him regularly something of what his fellow-workers have learned about materials, methods and machines. It spares him the needless grief and loss of finding out for himself what others may have paid dearly to learn. It helps him to multiply his capacity; to travel a little faster, to climb a little higher for the same expenditure of effort.

For the mission of the worth-while industrial journal, in whatever field, is to put the experience of each at the service of all.

Willard Chevalier
Publishing Director.

McGRAW-HILL PUBLISHING COMPANY, INC., TENTH AVENUE AT 36TH STREET, NEW YORK, N. Y.

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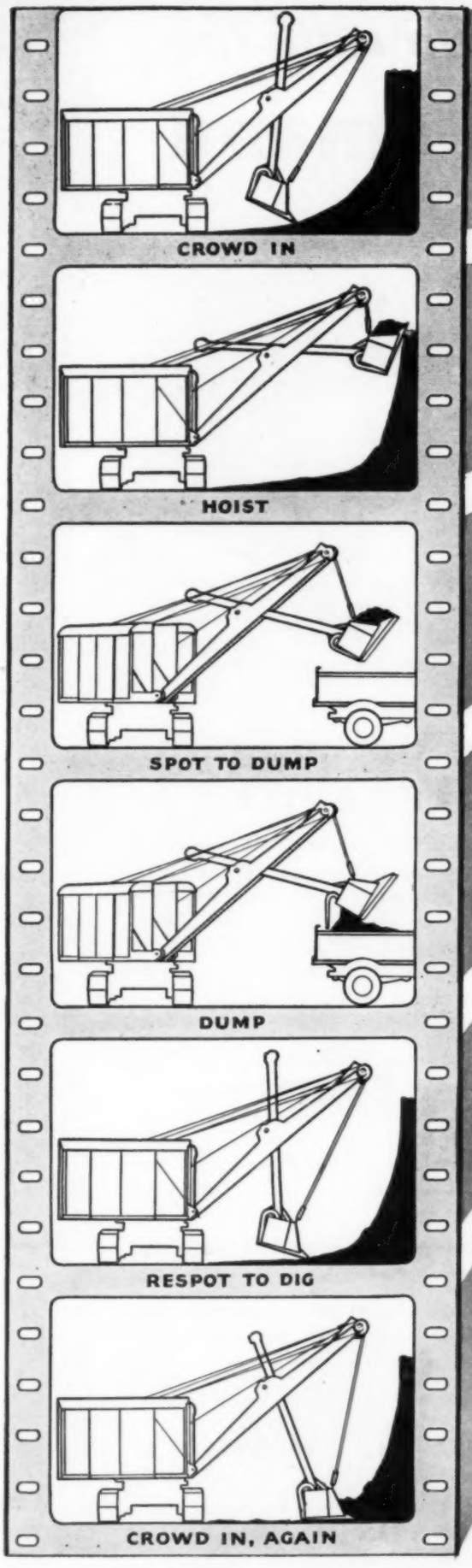

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every 20 seconds —all day long!

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Byers 1¼ yd. full circle Master Shovel, Crane, Dragline
Byers ¾ yd. full circle Shovel, Crane, Dragline, Trencher, Skimmer
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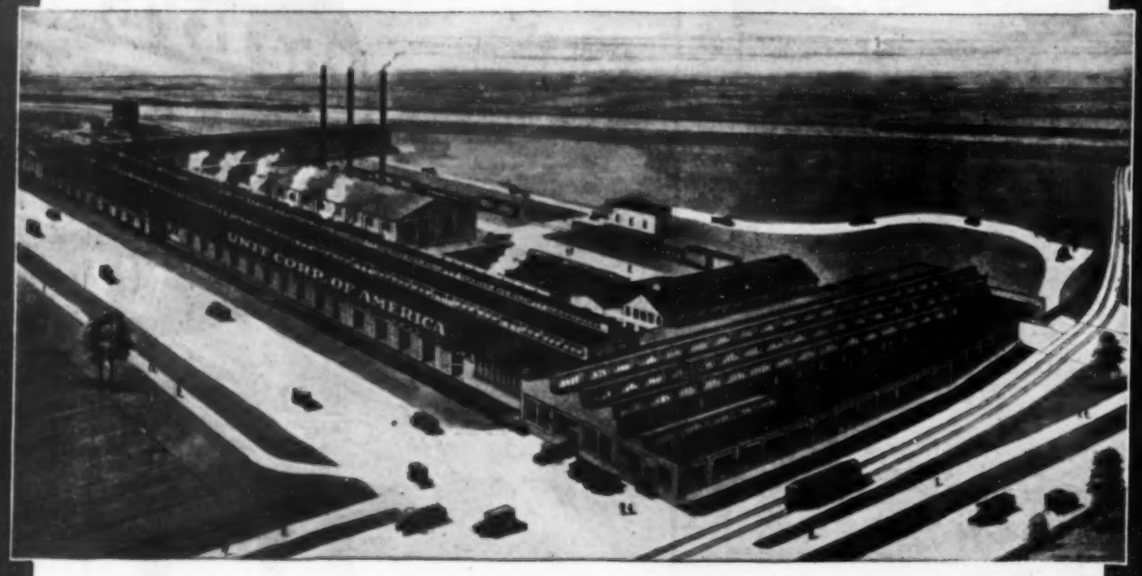
BYERS
Shovels & Cranes

To keep up with the
Increasing Demand



New Model 2-10 Gas Shovel

New Model 2-10 Gas Crane

New and improved units. Powerful crowd, one man operation, responsive control, speed, mobility and economy. Quickly converted to crane, clamshell, dragline, magnet, trench hoe and backfiller. Manufactured in our own new factory.

We have Moved to Our NEW FACTORY *

The local demand of four years ago has grown to a national and international demand for Universal products. Owners and users of our material handling and excavating equipment have demonstrated its superior performance and economy over a period of years. Repeat orders and universal acceptance have necessitated increased production facilities.

And now we have moved from Detroit to Milwaukee—to our own new factory, equipped with the most modern machinery and scientifically planned to facilitate production. More than ever before we are able to offer the greatest dollar for dollar value in design, materials and workmanship.

The location insures promptness in shipping both machines and service orders.

Constant improvements have been made in design, and if you do not have our latest literature on file we shall be glad to bring you up-to-date.

Write today for literature describing the New Model 2-10

UNIVERSAL POWER SHOVEL COMPANY

Division of Unit Corporation of America

Bankers' Building

*** MILWAUKEE, WISCONSIN**

NOW
"STEP ON THE GAS" MEANS SOMETHING to a shovel operator
Nor
wes
SLOAN & SONS
GRAND RAPIDS, MICH.
Give her the "gas" and step away to capacity greater than any other shovel, crane or dragline, of the same rated capacity, on the market today!
With the Variable Speed Motor, Accelerator Controlled, you can get the most out of your machine—take advantage of every possible opportunity for speed and increase your output 15 to 20%.
This wonderful, new, exclusive Northwest feature means a new source of profit that cannot be equalled by a machine powered with a governor controlled engine.
Ask about it—see it work.
Send for the Purple Booklet.
Northwest Engineering Co.
The world's largest exclusive builders of gasoline and electric powered shovels, cranes and draglines
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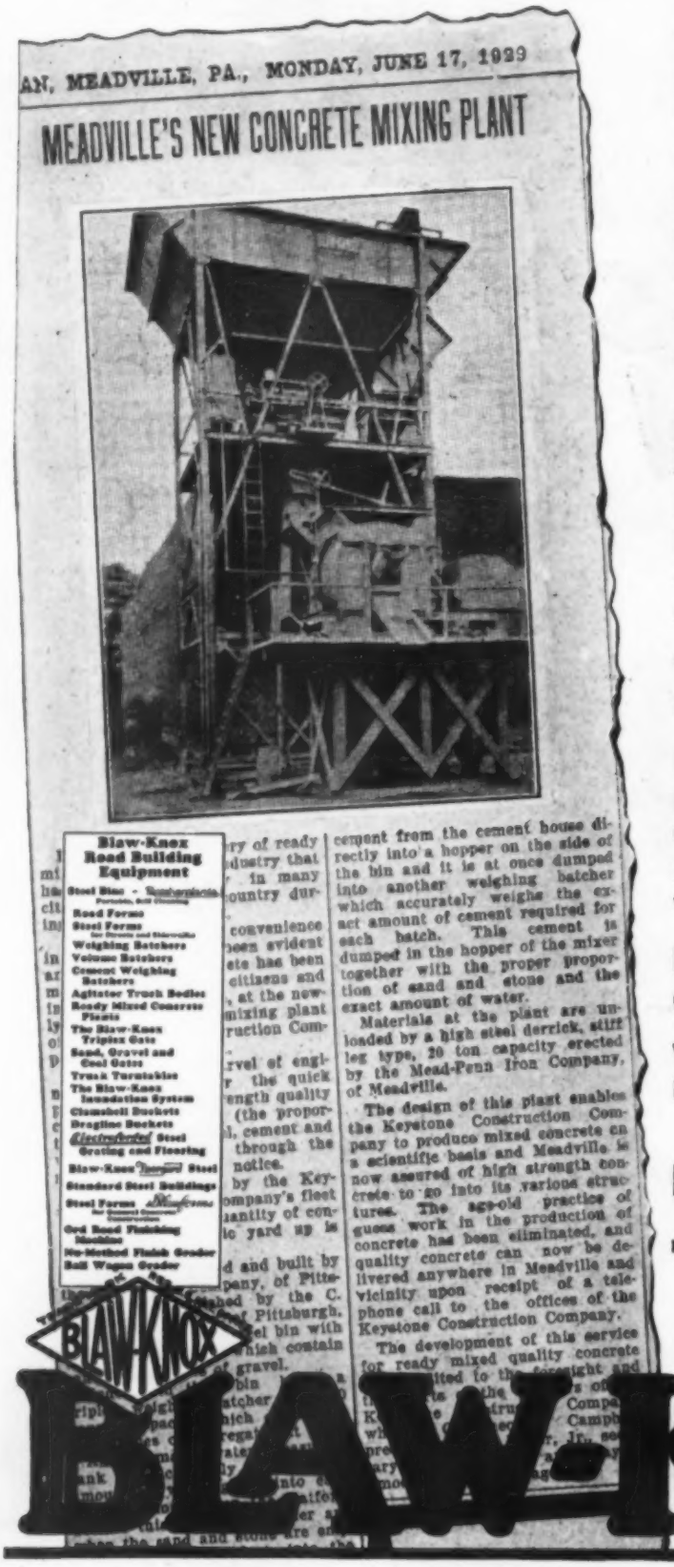
Chicago, Ill., U. S. A.
CM8-Orig
NORTHWEST
VARIABLE SPEED MOTOR
accelerator controlled
The best buy on the market today

Are You Also in a "Meadville" Situation?



AN, MEADVILLE, PA., MONDAY, JUNE 17, 1929

MEADVILLE'S NEW CONCRETE MIXING PLANT

Blaw-Knox Road Building Equipment

Steel Bins - Measuring Equipment (Volume, Weight or Inundation)
Road Forms
Steel Forms
Weighing Batchers
Volume Batchers
Cement Weighing Batchers
Agitator Truck Bodies
Ready Mixed Concrete Plants
The Blaw-Knox Triplex Gate
Sand, Gravel and Coal Gates
Trunk Turntables
The Blaw-Knox Inundation System
Clamshell Buckets
Dragline Buckets
Reinforcing Steel
Grating and Flooring
Blaw-Knox Truscon Steel
Standard Steel Buildings
Steel Forms
Ord Road Finishing Machines
No-Method Finish Grader
Ball Wagon Grader

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...convenience ...been evident ...ete has been ...citizens and ..., at the new- ...mixing plant ...ruction Com-

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... by the Key- ...ompany's fleet ...uantity of con- ...lo yard up is

...d and built by ...pany, of Pitts- ...shed by the C. ...f Pittsburgh. ...el bin with ...which contain ...of gravel.

cement from the cement house directly into a hopper on the side of the bin and it is at once dumped into another weighing batcher which accurately weighs the exact amount of cement required for each batch. This cement is dumped in the hopper of the mixer together with the proper proportion of sand and stone and the exact amount of water.

Materials at the plant are unloaded by a high steel derrick, stiff leg type, 20 ton capacity erected by the Mead-Penn Iron Company, of Meadville.

The design of this plant enables the Keystone Construction Company to produce mixed concrete on a scientific basis and Meadville is now assured of high strength concrete to go into its various structures. The age-old practice of guess work in the production of concrete has been eliminated, and quality concrete can now be delivered anywhere in Meadville and vicinity upon receipt of a telephone call to the offices of the Keystone Construction Company.

The development of this service for ready mixed quality concrete ...ited to the foresight and ...

...Compa... ...Campb...

that is—are your paving and building operations pretty well confined within an economical hauling radius.

The Keystone Construction Company has for years been doing most of the paving work and other concrete construction work in and around Meadville, Pa.

Their business grew in this city, they foresaw a future, and—

They employed Blaw-Knox Company to design and build a modern Ready Mixed Concrete Plant.

NOW—75% of this plant's concrete production is hauled to Keystone Construction Company's jobs —the other 25% is sold to consumers in and around Meadville.

This is a sound money-making idea for any contractor who is in a similar situation.

REMEMBER THAT—the Blaw-Knox Company is prepared to furnish a complete service for the production of ready mixed concrete, and its transportation in Agitator Truck Bodies to point of use without segregation of the aggregates.

Plant Layout... Steel Bins... Measuring Equipment (Volume, Weight or Inundation)... Agitator Truck Bodies

Write for Blaw-Knox literature "Showing the Way Into the Ready Mixed Concrete Business."

BLAW-KNOX COMPANY

686 FARMERS BANK BLDG., PITTSBURGH, PA.

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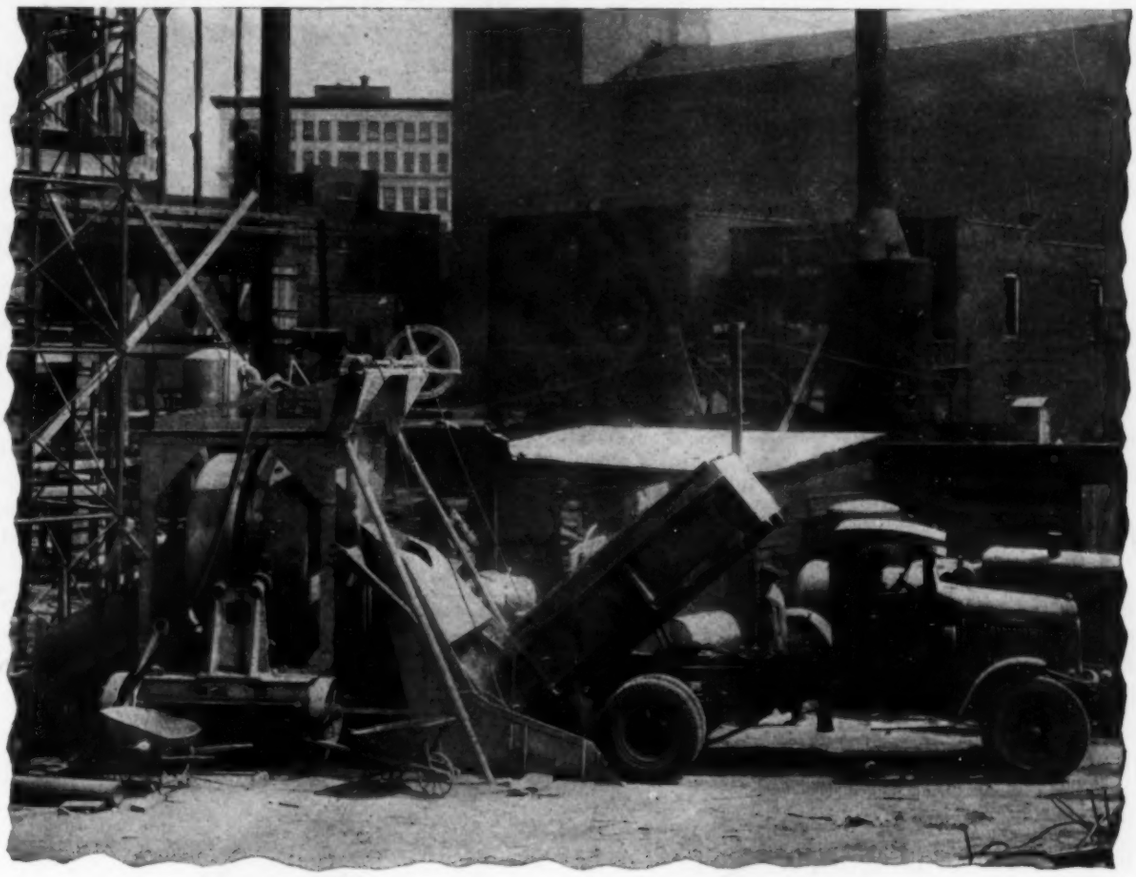
EXPORT DIVISION
Milliken Bros.—Blaw Knox Corp., Canadian Pacific Bldg., New York

BLAW-KNOX

LAKEWOOD CONSTRUCTION EQUIPMENT



Back Right In

A 28-S Building Mixer with paver type skip—batch trucks dump direct—less space required—bins, buckets, elevators and ramps eliminated—it's simple—it's faster.

Photo above shows a 28-S Lakewood Mixer with paver type skip as used by the W. J. Schirmer Co. at Akron, O. Complete details in the latest Lakewood Mixer bulletin. We have a copy for you.

EXPORT OFFICES: 30 Church St., New York City · · CABLE ADDRESS: Brosites

LAKEWOOD

The Lakewood Engineering Co., CLEVELAND · O.

For Pipe Line Couplings

Speed is often an important item in pipe line work. Taking time out to refit the wrench is costly when compared to the reversible ratchet operation of Lowell Ratchet Wrenches.

Work the Lowell with one hand or both—in places where there is lots of room or in cramped quarters where the back and forth ratchet movement is the thing that makes the job easy. Wherever bolts or screws must be tightened or loosened on construction work Lowell Wrenches save time and money. It's always quicker and easier to *pump* than it is to refit.

We will be glad to send you literature illustrating and describing the complete line of Lowell Reversible Ratchet Wrenches. If requirements call for big special wrenches, Lowell can meet them.

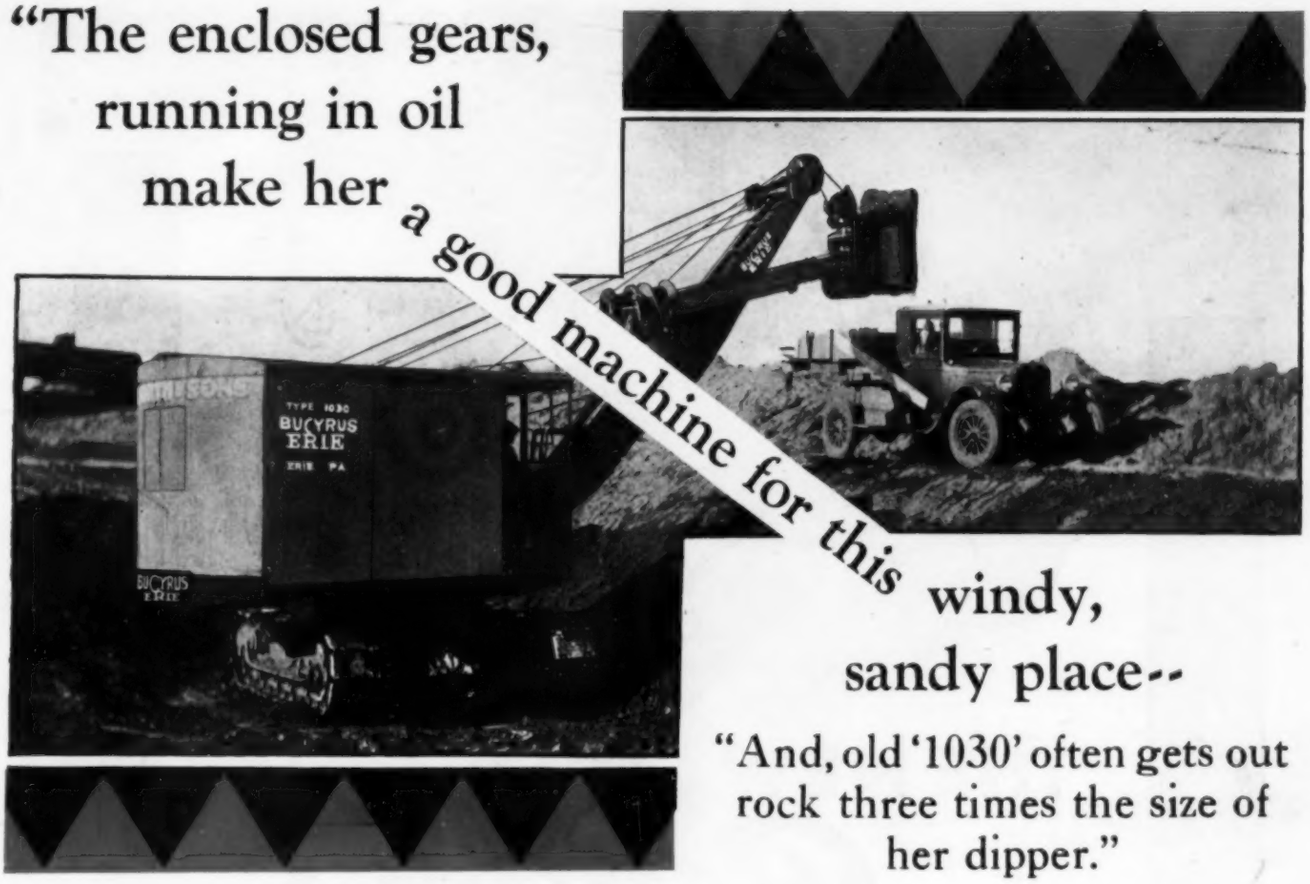
Send for catalog R.

LOWELL
REVERSIBLE
RATCHET
WRENCHES

LOWELL WRENCH COMPANY

WORCESTER, MASS.

"The enclosed gears, running in oil make her a good machine for this windy, sandy place--



"And, old '1030' often gets out rock three times the size of her dipper."

Whether you are using the "1030" BUCYRUS-ERIE as a Power Shovel, Dragline, Clamshell excavator, Crane, or Drag Shovel— there are two points you're bound to like:

1. The extra power that the "1030" shows in hard digging.
2. The way it shows its Quality by *standing up.*

Read how this works out for a contractor with real hard work to do:

"In making a channel change we used the BUCYRUS-ERIE '1030' as a dragline, and even though we had to go 26 feet deep, she pulled through sticky clay.

"Then we put on the shovel boom for rock work, and the old '1030' horsed out big rocks three times the size of the dipper.

"She's a good machine for this windy, sandy place, because the gears are enclosed and run in oil— open machines soon cut out in this country."— J. E. Smith & Sons, Noble, Okla.

A light machine that's *built right*

The enclosed gears Mr. Smith mentions are just one point of many, in a machine that's built better all through.

Look her over— starting from the one-piece steel truck frame— practically indestructible. Costs more than a structural steel job, of course, but it's worth it. Turntable of the same one-piece construction— holds the machinery units solidly in place.

Look at the big shafts— much larger than ordinarily used.

Compare the size of the clutches, which are of the good reliable outside band type, besides being so much oversize.

And you'll like the idea of having anti-friction bearings on *every* high speed shaft.

The "1030" sells itself

Watch a "1030" at work— time it for speed of digging cycle— see how the big 72½ hp. gasoline motor makes it possible to do harder digging than you'd expect from a machine this size.

We'll be glad to tell you where you can see "1030s" in your locality. May we send you a bulletin descriptive of this machine?

BUCYRUS-ERIE COMPANY
General Offices: South Milwaukee, Wis.
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Representatives throughout the U. S. A. Offices and distributors in all principal countries of the world.

BUCYRUS ERIE

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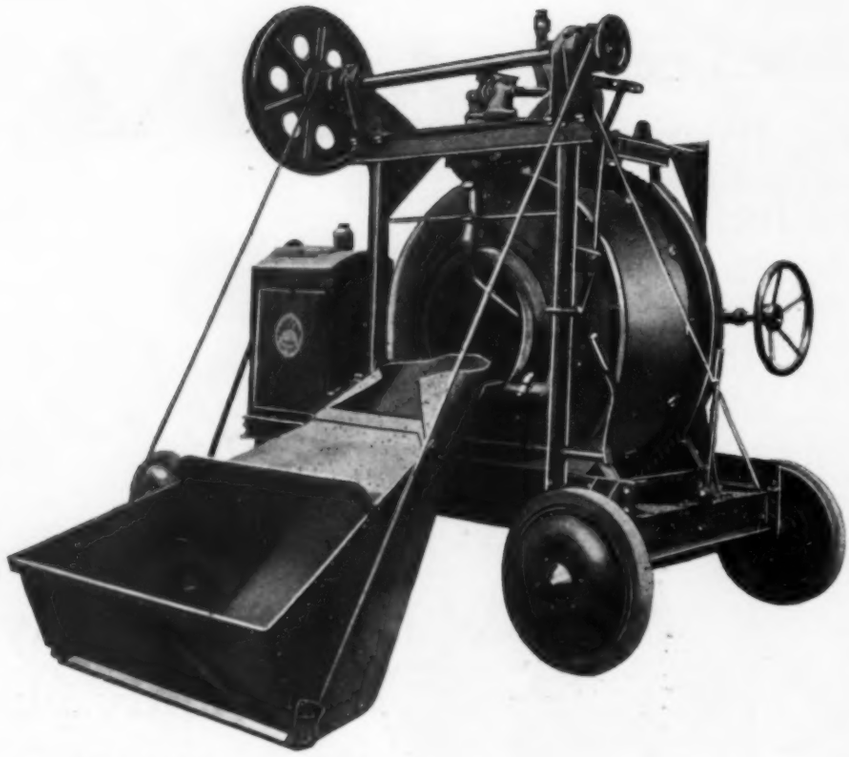
Adv. 790



THE NEW Ransome 7-S BUILDING MIXER

Built the Way Contractors Told us They Wanted it Built / / /

This means that in the design of the new Ransome 7-S Standard Building Mixer you will find the qualities that more than satisfy you—for leading contractors who knew what they wanted wrote the specifications.

Thus the new 7-S Standard Mixer is a unit of large capacity. Users wanted built-in ability to stand up under the hardest kind of service. They wanted a mixer light in weight so that it would be easy to move around the job. They asked for *simplicity* so that all parts could be easily operated, lubricated or replaced—a fast mixer insuring large output in fast time. They demanded the same improved water control as found on our large mixers.

Ransome engineers concentrated on all these requirements, keeping in mind a reasonable price. And the result? The new 7-S, painted a deep orange color; the last word in small mixer construction.

You will find the complete specifications interesting. May we send you our new bulletin No. 123?

Ransome Concrete Machinery Company

1850—Service for 79 Years—1929

Dunellen **New Jersey**

A Mouthful At Every Bite
...SWIFT AND SURE!...
The Type "K" Owen Bucket is the speed model of the Owen family. Strong, rigid and with sufficient weight and closing power to assure capacity grabs and overloads in loose materials. A rapid, general rehandler that stands up under long continued service—A positive producer of "A Bigger Day's Work."
Write for the Owen Type "K" Folder or for a complete Owen Catalog.
THE OWEN BUCKET COMPANY
6273 BREAKWATER AVE. CLEVELAND, OHIO
OWEN
K WIESE
Owen Buckets

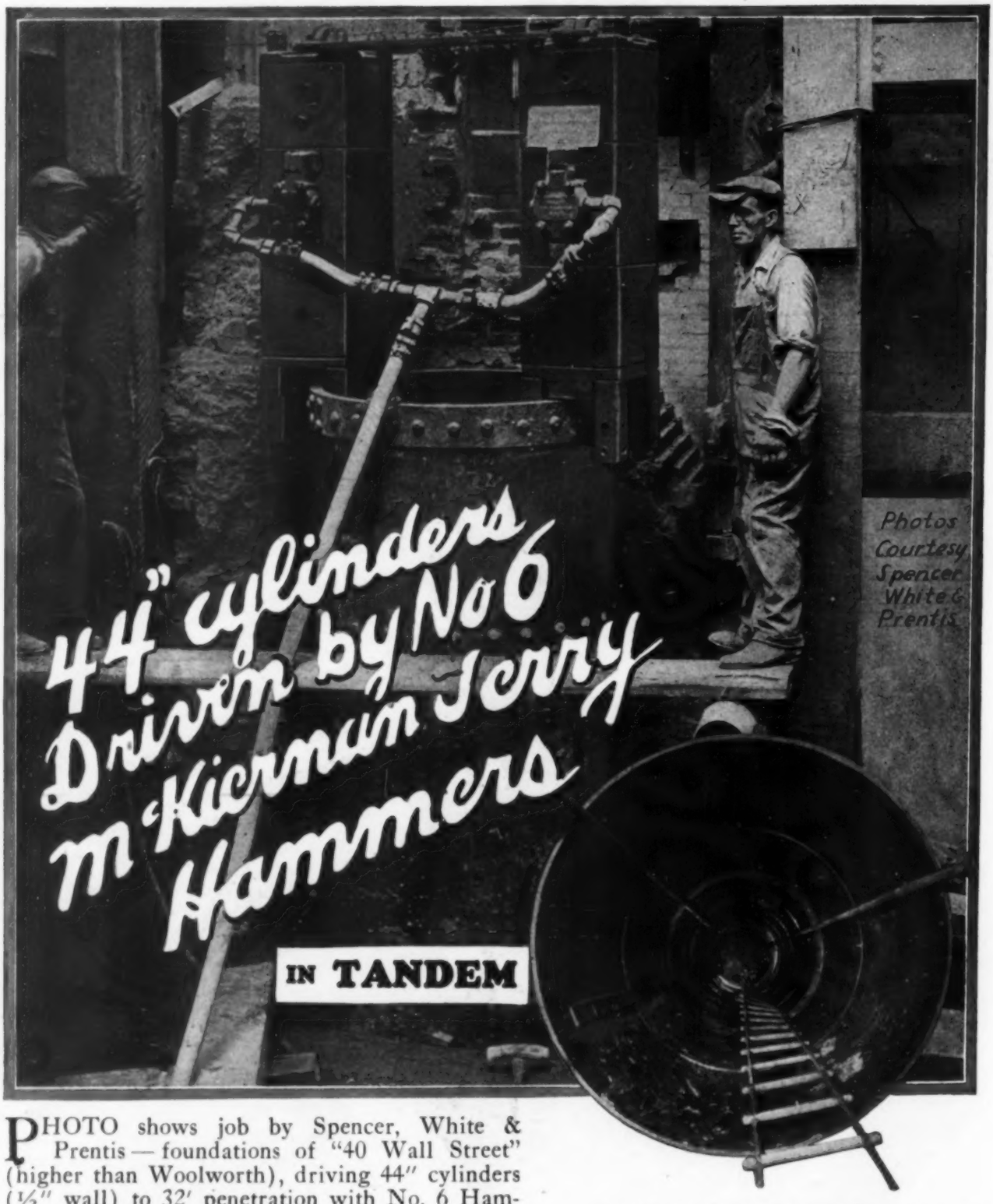


PHOTO shows job by Spencer, White & Prentis — foundations of "40 Wall Street" (higher than Woolworth), driving 44" cylinders (½" wall) to 32' penetration with No. 6 Hammers **in tandem.** One 9B2 drove 3 cylinders 52" diameter (⅝" wall) 32' penetration. All through sand and hardpan. **Cylinders, concreted, will carry 800 tons per sq. foot.** McKiernan-Terry Hammers also drove hundreds of other smaller pipe piles on same job. Yes sir—same story on most ALL the big front-page jobs—McKiernan-Terry Hammers!

Looking down into a cylinder, as driving progressed. Interior of cylinder was mucked out by hand labor.

McKiernan-Terry Drill Company

14 Park Row, New York

Pile Hammers and Accessories, Drilling Machinery

Works at Dover, N. J.

Agencies in All Principal Cities

Style B Patent Flattened Strand

"HERCULES" RED-STRAND

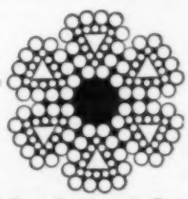
REG. U.S. PAT. OFF.

WIRE ROPE

Has Many Exclusive Points of Advantage

This wire rope is the combination of extra high grade material with a construction that provides specific advantages unequalled by any other type of wire rope manufactured.

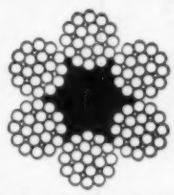
Some of the chief features of this construction are: (1) Grade for grade it is stronger than any Round Strand construction, because the shape of the strands permits the use of more metal. Note the small hemp center. (2) The keystone shape of each strand offers greater resistance to crushing. (3) The outer wires in each strand conform to a circle, consequently surface wear is distributed over a greater number of wires. This smooth outer surface also reduces wear in grooves of drums and sheaves. (4) This rope gives a higher factor of safety, not only because of its greater strength, but also because its flatter surface between the strands themselves minimizes the danger of the strands cutting each other.



A Cross Section of a Genuine Style B Patent Flattened Strand Wire Rope

Style B Patent Flattened Strand Wire Rope is made up of 6 strands of 25 wires each, but all 6x25 wire ropes are not of the genuine Patent Flattened Strand construction. Some 6x19 Round Strand ropes, in addition to the usual 19 wires, also have 6 small "filler" wires in each strand to make it more compact. These "filler" wires, however, do not increase the rope's strength.

When you are offered 6x25 wire rope, it will pay you to find out whether it is a "filler wire" construction or the genuine Patent Flattened Strand construction. We particularly recommend Style B Patent Flattened Strand "HERCULES" (Red-Strand) Wire Rope for use on heavy duty cranes, clam shell buckets, dredges, excavators, mine hoists and shovels.



A Cross Section of a 6x19 Round Strand Wire Rope Filler Wire Construction

If you are not entirely satisfied with the amount of service you are now getting for each wire rope dollar that you spend, we would like to have you give this remarkable wire rope a chance to show you what it can do.

Made Only by

A. LESCHEN & SONS ROPE CO. Established 1857

5909 Kennerly Avenue

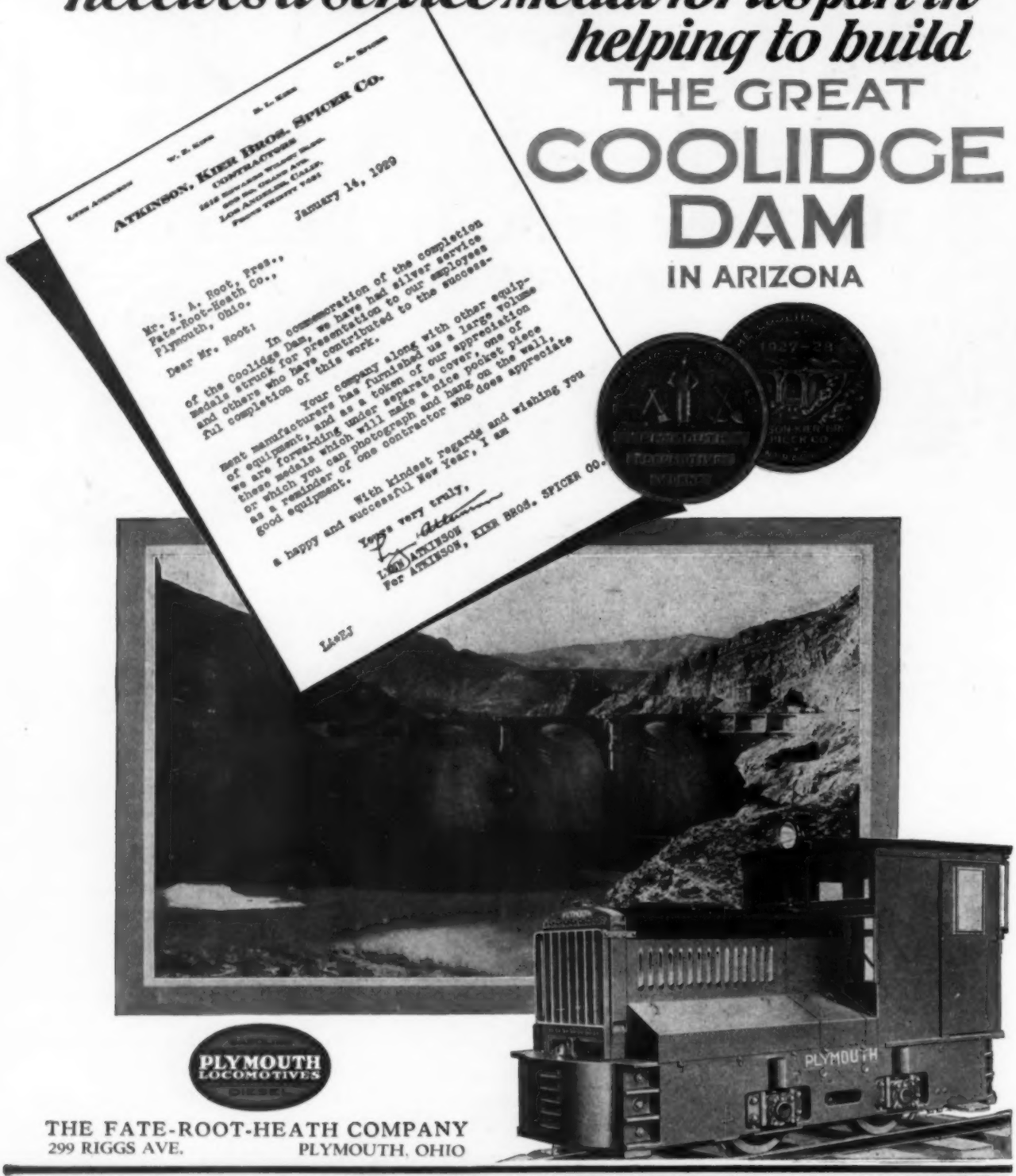
ST. LOUIS

New York **Chicago** **Denver** **San Francisco**

PLYMOUTH

Receives a Service Medal for its part in helping to build

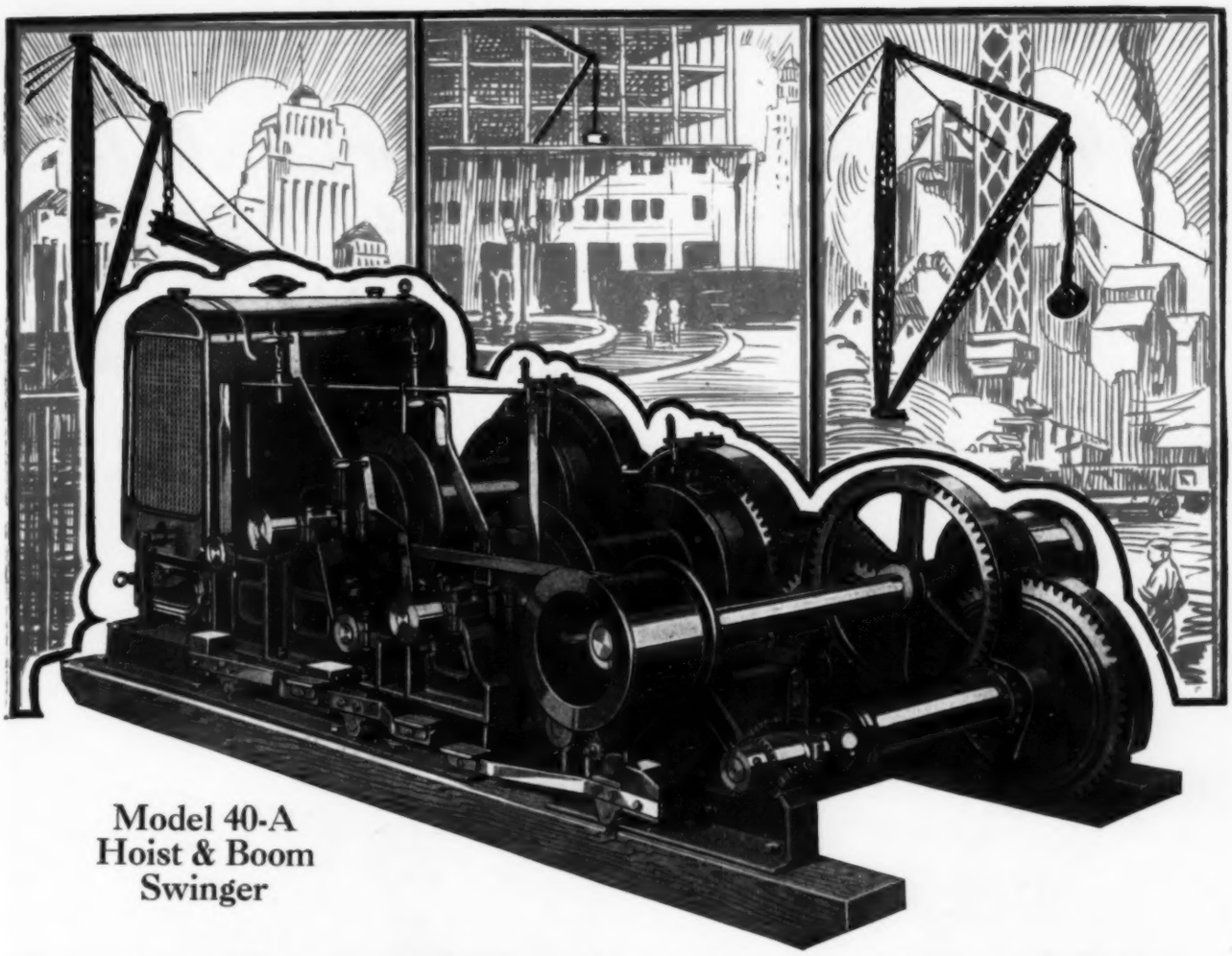
THE GREAT COOLIDGE DAM IN ARIZONA


ATKINSON, KIER BROS. SPICER CO.
CONTRACTORS
January 14, 1929
Mr. J. A. Root, Pres.,
Fate-Root-Heath Co.,
Plymouth, Ohio.
Dear Mr. Root:
In commemoration of the completion of the Coolidge Dam, we have had silver service medals struck for presentation to our employees and others who have contributed to the successful completion of this work.
Your company along with other equipment manufacturers has furnished us a large volume of equipment, and as a token of our appreciation we are forwarding under separate cover, one of these medals which will make a nice pocket piece or which you can photograph and hang on the wall, as a reminder of one contractor who does appreciate good equipment.
With kindest regards and wishing you a happy and successful New Year, I am
Yours very truly,
ATKINSON, KIER BROS. SPICER CO.
For ATKINSON, KIER BROS. SPICER CO.
L&EJ
PLYMOUTH

PLYMOUTH LOCOMOTIVES DIESEL

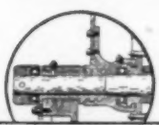
THE FATE-ROOT-HEATH COMPANY
299 RIGGS AVE. PLYMOUTH, OHIO

PLYMOUTH
GASOLINE LOCOMOTIVES DIESEL



Model 40-A
Hoist & Boom
Swinger

Hoisting—Placing—Rehandling



The Hoist With The
EXCLUSIVE BRONZE SCREW
PATS. APP. FOR

IMPORTANT FEATURES IN BROWN BOOM SWINGER

The exclusive bronze screw thrust with positive clutch release gives you absolute control without any possibility of failure to engage or disengage clutches or clashing of gears in going from forward to reverse. One brake controls both directions of rotation.

THE MODEL 40-A BROWN "GIANT-LINE" HOIST with boom swinger fits ideally into practically every big construction job.

4,000 to 5,000 pounds single line pull at 200 feet per minute for elevating materials, pouring concrete, steel erecting, stone setting, rehandling, etc., means SPEED and ECONOMY.

A QUARTER CENTURY SPECIALIZATION in the manufacture of Hoists for all purposes—with thousands of satisfactory installations throughout many parts of the World, ensures DEPENDABILITY PLUS REAL VALUE.

A type and size adapted to every requirement from 4 to 50 H.P.

Catalog R Upon Request

THE BROWN CLUTCH CO.

Sandusky, Ohio, U. S. A.

SINGLE & MULTIPLE DRUM – REVERSIBLE

BROWN GIANT-LINE HOISTS

NON-REVERSIBLE AND CONVEYOR TYPES

HOIST SPECIALISTS FOR A QUARTER CENTURY

"Northerns" in service—

THESE DEPENDABLE EASILY PORTABLE UNITS INCREASE PRODUCTION AT A FRACTION OF THE COST

GRAVEL CAR UNLOADER AND CONVEYOR

THE NORTHERN "BUILT BETTER" MATERIAL HANDLING EQUIPMENT

CONCRETE DELIVERED TO FORM

CAR UNLOADERS—PORTABLE AND STATIONARY CONVEYORS IN ANY LENGTH CAPACITY OR TYPE

UNEQUALLED FOR THE FAST AND ECONOMICAL HANDLING OF SAND-GRAVEL STONE-DIRT OR WET CEMENT

COMPLETE REPAIR PARTS PLUS EXPERT SERVICE AT THE POINTS INDICATED NATIONAL SERVICE

The "Northern" Gravel Car Unloader Is the First of Its Type to Operate Successfully Under Cars and Over Rails Without a Pit

TERMS AND OUR 5 YEAR GUARANTEE

NORTHERN CONVEYOR & MFG. CO.,
Janesville, Wisconsin

Send catalog of Northern Conveyors and Car Unloaders.

Name .....

Address .....

City .....

The ½ Yd. UNIVERSAL-35

Crane—clamshell—dragline—shovel —skimmer scoop—backdigger

Mounted on the famous 2 Speed Center Drive Crawler.

Universal-35 operated as a clamshell by Reed and Abee, Inc., on the $200,000 sewer contract for the $10,000,000 rayon plant of the American Enka Corporation, Asheville, N.C.

You can change the boom equipment at any time, to the most efficient type for the immediate job at hand. Hence it's the easiest thing in the world to keep a Universal-35 busy.

THE UNIVERSAL CRANE CO.
Lorain, Ohio

On shallow basement excavating, handling shale and loam, this Universal-35 shovel loads as high as 400 trucks in 10 hours, averaging 6 passes per truck load.

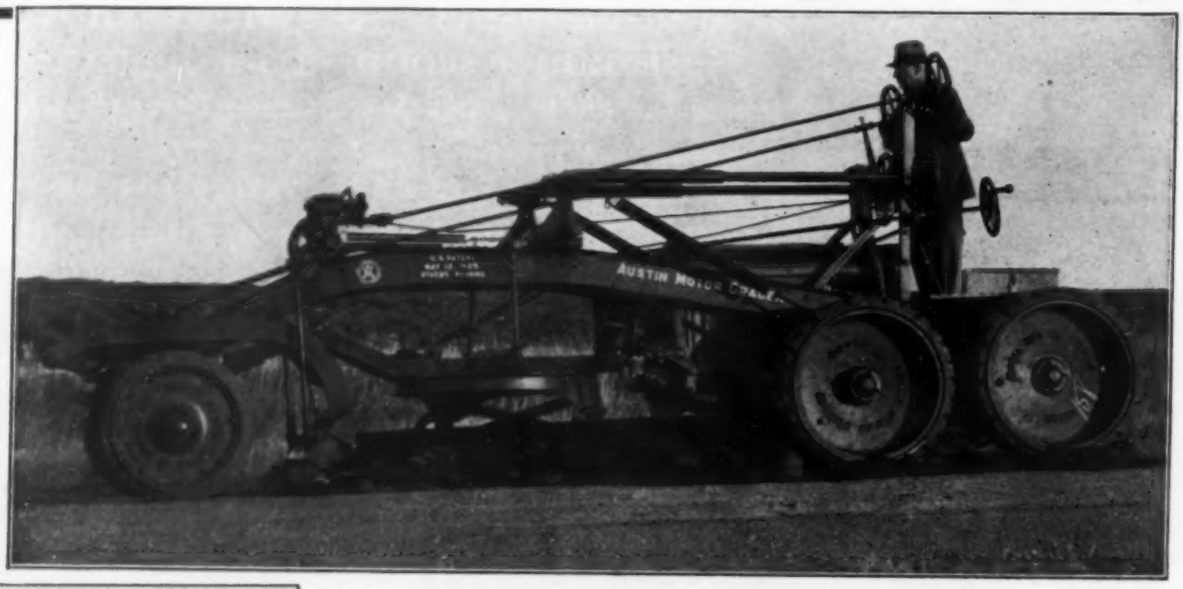
The Universal-35 skimmer scoop with a cutting stroke of 11½ feet, holds a smooth level grade. This machine has the same superstructure as the Universal-35 shovel or crane.

With backdigger boom this machine is excavating for 24" sewer tile. When the excavation is completed, the machine may be quickly changed over to a crane for lowering the pipe.

UNIVERSAL-35

The AUSTIN

MORE POWER . . MORE TRACTION



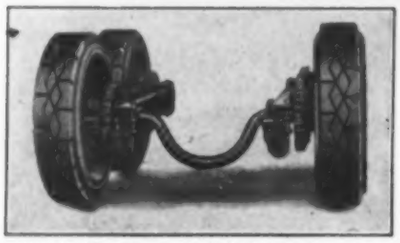


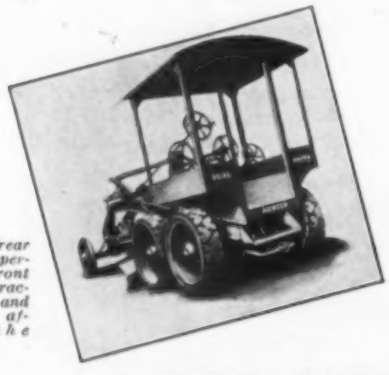
Illustration shows Dual Drive construction.

The greatest improvement in motor graders

The Austin Dual Drive represents the greatest improvement ever made in motor graders. Each rear drive wheel on its differential axle is connected by a roller bearing drive chain to a similar wheel of the same diameter immediately in front of it, converting all four wheels into drive wheels. The two forward drive wheels are mounted on a strong steel axle base at the front of the tractor, and turn freely on their roller bearings. The front end of the tractor is carried on its own drive wheels and axle instead of on the frame of the grader.

Austin Dual Drive Motor Graders are built around McCormick-Deering 10-20 and 15-30 tractors. 50" x 16" tires are used on the 15-30 models. The 10-20 is regularly fitted with 40" x 6", but 40" x 10" are recommended for maximum service requirements.

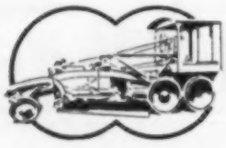
Other Austin features are—a gearless, screw type blade lift; ball and socket joints; leaning front wheels; cabs and snow removal equipment. Front or rear scarifiers can be furnished when desired. Complete information on request.



The pivotal rear connection permits the front end of the tractor to rise and fall without affecting the grader.

THE AUSTIN-WESTERN LINE

Leaning Wheel Graders—Straight Wheel Graders—Motor Graders—Elevating Graders—Crawler Dump Wagons—3-Wheeled Rollers—Tandem Rollers—Scarifiers—Rock Crushers—Portable Conveyors—Street Sweepers—Motor Sweepers—Sprinklers—Road Oilers—Hot Patch Portable Asphalt Plants—Plows and Scrapers.

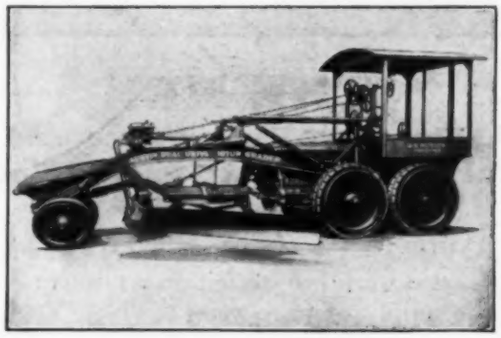
THE NEW  DUAL DRIVE

DUAL DRIVE

FOR MOTOR GRADERS . .

4-wheel drive revolutionizes grader performance

The Austin Dual Drive Motor Grader has set new standards of grader performance. More work done per day—more days' service per year—lower road maintenance costs — these phrases and others equally significant are used to describe its increased capacity for work under any and all conditions.



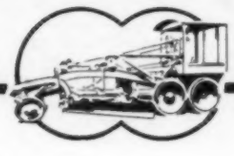
In bad weather when other graders are idle because they are unable to get traction on the soft ground you'll find the Austin Dual Drive turning out its full quota of work—pulling out of wet spots that would mire a two-wheel drive machine hopelessly—sticking to the sides of slippery roads that would ordinarily slide a grader into the ditch. And when the "going" is against hard surfaces you'll see the Austin Dual Drive keeping its front up to work that would force other machines to side-slip.

It turns in a brand of performance that can't be touched by other graders because it has the exclusive Austin Dual Drive—drives through *four* wheels in the rear. The entire weight of the tractor is carried on these *four* drive wheels. This weight and the *increased ground contact* assure traction that will stall the motor before the wheels spin. The Dual Drive *uses all of the reserve power* that the motor can deliver. That's why it keeps going when the ground is too wet and rough for other machines. The Austin Dual Drive Motor Grader will stand 50% more side pressure on the grading blade and will stand up to hard work because of the additional bracing strength provided by the *four* drive wheels. Austin advantages are enjoyed without increase in the size of the motor or additional maintenance expense.

If you are responsible for grading work and road maintenance costs you cannot afford to be without complete information about the Austin Dual Drive. Your request will bring it.

The Austin-Western Road Machinery Company, 400 North Michigan Avenue, Chicago, Ill. Branches in principal cities.

Austin-Western
ROAD MACHINERY

THE NEW  DUAL DRIVE

THE MEN

Organized Ability, Past Performance, and Capacity for Handling Vast Projects Successfully Placed the Job in the Hands of —

PATRICK McGOVERN—the man who masters seemingly impossible engineering problems—and work has started on a tunnel twenty-two miles long that will double the supply of pure water for New York City's six million.

Thirty-eight years ago, Pat McGovern—a brawny lad having an uncanny knack with a pick—left County Cavan in North Ireland and came to America. Landing 'broke' he immediately got a job as a day laborer at $1.75 a day. He has been working every since, and has just recently won the contract for his latest big job—a forty-two million dollar project.

AND

JOHN S. MACDONALD, youngest chief engineer and tunnel specialist, worked for McGovern during his vacations at Dartmouth and ever since his graduation in 1913.

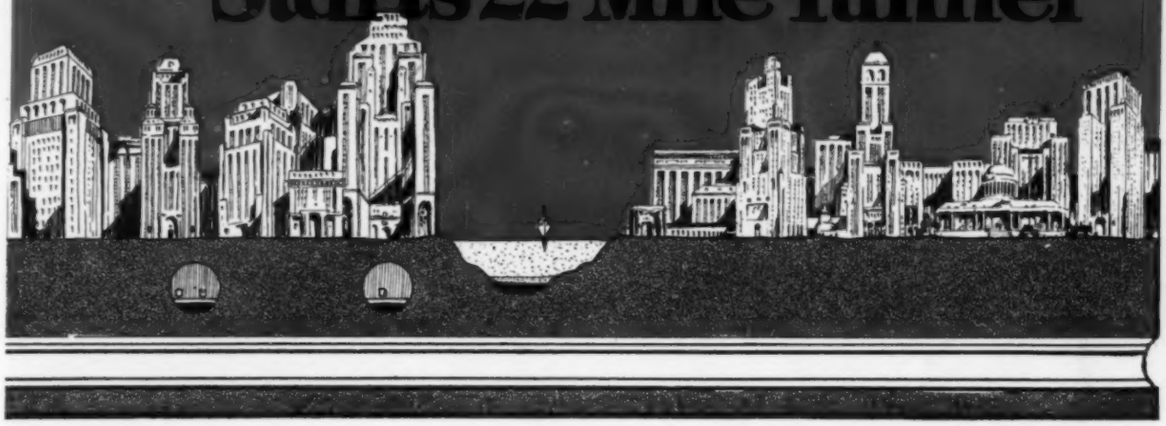
He was engineer on the New York Barge Canal, Fort Point Channel Tunnel at Boston, Twin Tunnels under East River at New York, 14th Street Subway System at New York, and the Causeway Bridge over Jamaica Bay, New York.

He was chief engineer on the twenty-six million dollar subway section in Philadelphia, the 53rd Street Tunnel in New York, and now as a crown to his many engineering monuments, he—as Vice President of the McGovern interests—will be chief engineer on this huge project.

A WORLD'S

TWENTY-TWO SHOVELS BOUGHT AND FOR ONE JOB .....

Patrick McGovern, World's Greatest Tunnel Builder Starts 22 Mile Tunnel



THE JOB

A water conduit between Yonkers and Brooklyn twenty miles long, seventeen feet inside finished diameter, and eight hundred feet deep through solid rock to double the supply of pure Catskill water throughout the City of New York and to insure its continuous flow.

The tunnel will pass under the rapid transit subways—under the deep foundations of New York's huge sky scrapers—under railroad tunnels—under East River and Harlem River and come to the surface again in Brooklyn. Nineteen shafts will be sunk to depths varying from 500 to 800 feet. Three thousand men will work nearly six years to complete the job.

Special machinery has been designed to meet individual working conditions—machinery that must be dismantled, lowered down the shafts, and reassembled under ground—machinery that dare not fail.

Power shovels were needed that could meet the conditions found when working in a nineteen foot tube hundreds of feet under ground—power shovels requiring a minimum of maintenance and capable of twenty-four hour day-in-day-out service over a period of years. Many designs were offered, but it remained for Osgood engineers, with more than half a century of continuous experience designing excavating machinery, to build the machines that met McGovern's exacting requirements.

RECORD

AT ONE TIME BY ONE COMPANY ..... OSGOODS, OF COURSE!

Roebling

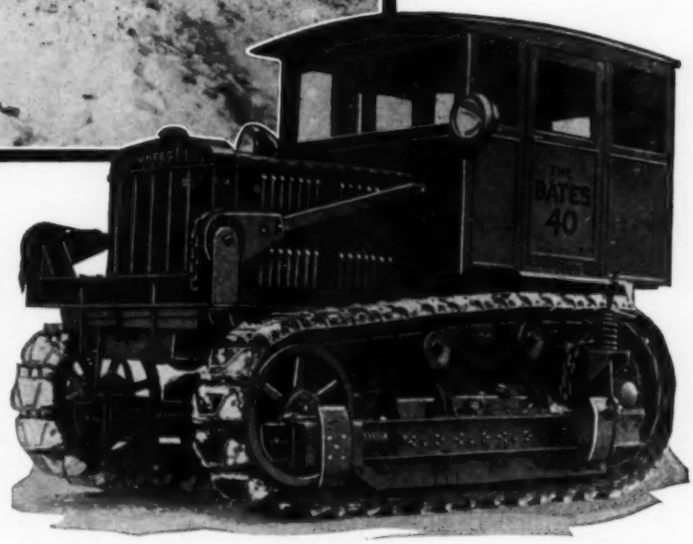
"Blue Center" Steel Wire Rope

Again demonstrating its superior strength and dependability, Roebling "Blue Center" Steel Wire Rope hoists and places a 115-ton Oil Chamber.

John A. Roebling's Sons Company
Trenton, New Jersey

No Snow-bound Roads

With this Equip-ment



THE Bates "STEEL MULE" can be depended upon for every phase of snow fighting and snow removal. The Bates works easily in crowded streets and can be quickly turned within its own length. There are models to handle the lightest city work to the heaviest work encountered on drifted country roads. Always plenty of reserve power for the most severe conditions.

The Bates "STEEL MULE" is a year around tractor and no special models are necessary for snow removal or other winter operations. The several accessories on the "Snow Special" provide additional conveniences for various winter operating conditions.

THE BATES SNOW SPECIAL

Complete protection is provided by an enclosed cab with glass windshield and windows. Equipment consisting of electric starter, electric generator and lights, oil gauge, comfortable seat and controls makes maximum efficiency for every snow and winter operation.

MANUFACTURED BY

FOOTE BROS. GEAR & MACHINE CO.

111 N. Canal St. Dept. 107 Chicago, Ill.

Established 1859

Send the coupon today for complete information on the Bates "Snow Special." No obligation of course

BATES Steel Mule

NRB
107

FOOTE BROS. GEAR & MACHINE CO.
111 N. Canal St.
Dept. 107
CHICAGO, ILL.

Please send me copy of the Bates Tractor Book.

Signed_____

Address_____

STRUCTURAL STEEL CREATED THE SKYSCRAPER

STEEL betters any building

STEEL is the strongest building material . . . the safest to work with . . . the most adaptable. Steel permits the greatest speed in construction, occupies less space and allows larger interiors. Steel can be erected any time, anywhere, in any weather, with expedition. Steel is fool-proof—it will stand more abuse than any other material. The properties of steel are known *before* it goes into construction—and those properties are kept consistent by constant test and analysis at the mill.

No other building material is so flexible in its application as steel . . . or permits such variety in design. No other type of building is so easily and economically remodeled, removed, altered or extended as a steel structure. Steel provides a stronger, safer, more adaptable building medium for any type of modern building or bridge—large or small. Before you build—no matter what the nature of the structure—consider steel.

A Technical Service Bureau is at the disposal of architects, engineers, owners and others who have need of any information which can be supplied through the American Institute of Steel Construction, Inc.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC.

The co-operative non-profit service organization of the structural steel industry of the United States and Canada. Correspondence is invited. 200 Madison Avenue, New York City. District offices in New York, Worcester, Philadelphia, Birmingham, Cleveland, Chicago, Milwaukee, St. Louis, Topeka, Dallas and San Francisco.

The Institute publishes twelve booklets,

STEEL

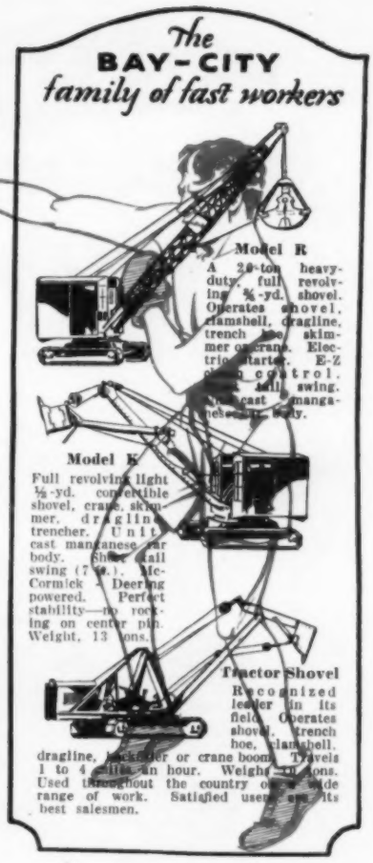
INSURES STRENGTH

AND SECURITY

one on practically every type of steel structure, and provides also in one volume, "The Standard Specification for Structural Steel for Buildings," "The Standard Specification for Fire-proofing Structural Steel Buildings," and "The Code of Standard Practice." Any or all of these may be had without charge, simply by addressing the Institute at any of its offices.

Reach Counts—

when both feet are on the ground


The
BAY-CITY
family of fast workers
Model R
A 20-ton heavy-duty, full revolving ¾-yd. shovel. Operates shovel, clamshell, dragline, trench hoe, skimmer or crane. Electric starter. E-Z power control. Full revolving cast manganese car body.
Model K
Full revolving light ½-yd. convertible shovel, crane, skimmer, dragline, trencher. Unit cast manganese car body. Short tail swing (7 ft.). McCormick-Deering powered. Perfect stability—no rocking on center pin. Weight, 13 tons.
Tractor Shovel
Recognized leader in its field. Operates shovel, trench hoe, clamshell, dragline, backfiller or crane boom. Travels 1 to 4 miles an hour. Weight 7½ tons. Used throughout the country on a wide range of work. Satisfied users are its best salesmen.

Bay City Tractor Shovel— Convertible

Here we show the start of work on the new boxing Arena for the Michigan State Fair Grounds, Detroit. When completed it will have a seating capacity of 35,000 persons.

When Rocque and Gibbs, Detroit contractors, received the sub-contract from J. A. Utley Construction Co., to erect the frame work, they put their standard Bay City Tractor Shovel on the job. Bucket and dipper stick were removed and a wooden extension spliced on the 15-foot boom, giving the composite boom a total length of 35 feet.

This is just another illustration of the convertibility of Bay City Shovels. They are sturdy and compact. Mobility, speed, economy and "guts" enough to meet exceptional requirements are built into all our machines. We also make special attachments to convert shovels into cranes, draglines, trench-scoops and back fillers.

Bid with Bay City's on all excavating or erection jobs and get the contract. Let us tell you how and why—WRITE.

BAY CITY SHOVELS, Inc.

***formerly* Bay City Dredge Works**

New York Office—
302 Broadway

BAY CITY, MICH.

BAY-CITY

FULL OR PART CIRCLE — SHOVELS — CRANES — EXCAVATORS

Both Travel as the Crow flies

For weeks prior to the opening of the National Aeronautical Exposition August to September at Cleveland, 12 "Iron Mules" were busy enlarging Cleveland's extensive Airport.

As the crow flies they went, direct from loader to fill—hustling grader to bigger daily yardages—cutting dirt moving costs, increasing profits.

The "Iron Mule" is the modern dirt-mover—in speed, power, traction, and adaptability—it not only saves time by taking the short route from loader to fill—road or no road—but it is instantly spotted for loading, and dumps over fills without having to back up, b cause driver is always facing the load.

"Iron Mules" are 2 and 4 yard dump bodies mounted on the McCormick-Deering tractor Model 20. 2 yard is gravity dump with heavy duty wheels—4 yard has crawler tracks and power hoist.

Time's money—profit. Mail the coupon. Get the illustrated folder and name of nearby contractor. See them in action before you invest a nickel.

From 3 to 60 Units

Scores of contractors have fleets varying in size from 3 to 60 units. Any one of these "Iron Mule" owners will tell you that there is no equipment to equal these tractor dumps for short haul dirt moving. They tackle jobs impossible to trucks and teams—give more yardage at less cost.

And you'll find Hughes-Keenan Dump Bodies for all makes of light trucks the stoutest units you ever set eyes on.

See Hughes-Keenan "Iron Mules" and Dump Bodies at 1930 Road Show, Atlantic City, Jan. 11 to 17

Send Coupon for Folder

Hughes-Keenan Company
Mansfield, Ohio
Gentlemen:

Please send without obligation your free illustrated "Iron Mule" Folder and dump body literature.

Name.....

Address.....

City..... State.....

THE HUGHES-KEENAN COMPANY

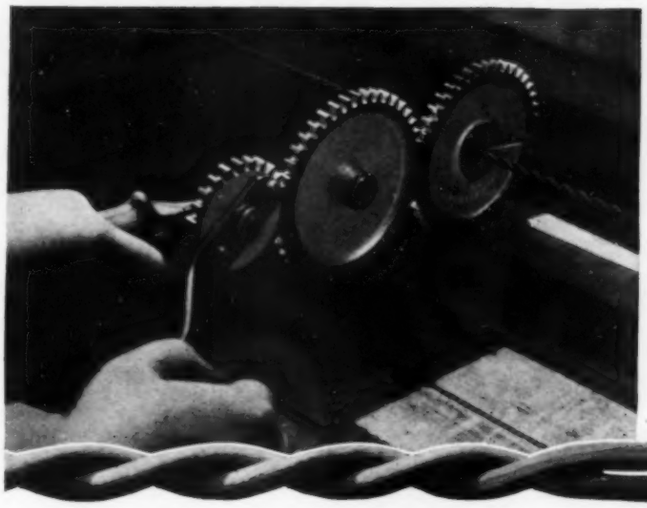
MANSFIELD OHIO

IRON MULE

TRADE MARK REG. U.S. PAT. OFF.

TRACTOR DUMP

MOUNTED ON McCORMICK-DEERING



Save—
—money
—time
—labor

Twist all Sizes of Form Wire with the

LIGHTNING WIRE TWISTER

MAIL THE COUPON!

This device is one of the biggest time and labor savers you ever saw. A *perfect twist* (see photo) is given to form wire of all sizes from No. 8 to No. 16, single or double strand in a few seconds—saving you several minutes on *every wire twisted.* Even on small jobs this means hours saved—and time saved is money in your pocket.

No loop is left in the center, as with hand twisting. Wires are given a uniform twist to any degree of tightness desired. Can twist close to the spreader. Better and tighter forms are made. Wall forms are held to exact lines.

The Lightning Wire Twister is built to last a life-time. No parts to lose. Nothing to get out of order. Anybody can learn to operate it in two minutes. Nothing could be simpler. *Weighs only* 5 *lbs.* Every form gang should have one. Contractors are buying it as fast as they learn about it.

Put a "Lightning Wire Twister" on *your* job and watch the form go up. *The coupon brings complete details and prices*—MAIL IT.

Responsible dealers wanted for exclusive territories

Royson Manufacturing Co., Inc.

21 Silver St., Springfield, Mass.

Send this coupon—no obligation

Royson Manufacturing Co., Inc., 21 Silver St., Springfield, Mass.
Please tell me by return mail how to "SAVE-MONEY, TIME and LABOR" on form work.

Name.....

Address.....

City.....

Position.....

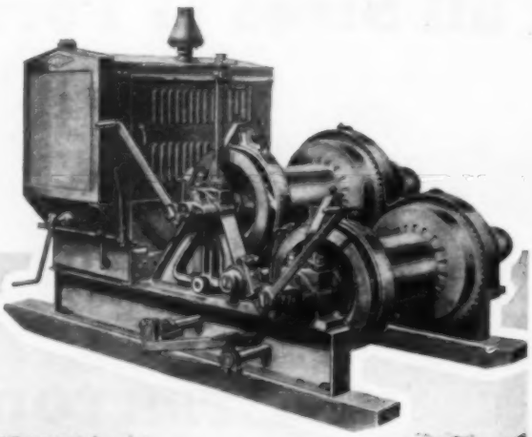
CLYDE HOISTS-DERRICKS

"performance plus/" That is what leading contractors say about Clyde hoists and derricks - and that is an important factor to be considered when buying a hoist. The fact that to-day there are over 10,000 Clyde units, operating all over the world, is an absolute sign of satisfactory performance. Below is shown a Clyde two drum gas hoist operating a pile driver for O. C. Howey.

You'll take PRIDE

CLYDE

In your CLYDE



CLYDE IRON WORKS SALES CO.

DISTRIBUTORS FOR CLYDE IRON WORKS DULUTH, MINNESOTA

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1325 STANDARD BANK BLDG.

CLYDE TWO MARKS OF GUARANTEED QUALITY

SUCCESSFUL PERFORMANCE FOR AGC-A-1

FRICTIONLESS

BEARINGS

on every high speed shaft

ON THE Half-Yard Insley all shafts carrying mechanism doing any heavy, fast and continuous work are mounted on roller bearings throughout.

As a result, every digging function of the Insley—the hoist, crowd, pull back and swing—as well as every control is speeded up, made smoother and made fool proof. The fullest power of the engine is turned into line pull. The highest speed of the Insley is developed and maintained with the least physical effort on the part of the operator.

In short, because of frictionless bearings, the Insley develops the greatest operating efficiency at the lowest operating cost.

And yet ball and roller bearing construction is only one of the many features of the Half-Yard Insley that set it apart as the outstanding shovel in its class.

INSLEY

INSLEY NC

INSLEY MANUFACTURING COMPANY, Engineers and Manufacturers INDIANAPOLIS, INDIANA *Division of National Equipment Corporation*

732

American Steel & Wire Company

American Wire Rope

MEASURED in the amount of service received, American Wire Rope is the most economical rope made.

You should get Wire Rope on the basis of service. A rope like American Wire Rope will give you reliable service over a long period of time because it is superior rope.

Consult nearest office. Our engineers will select the right rope for your needs.

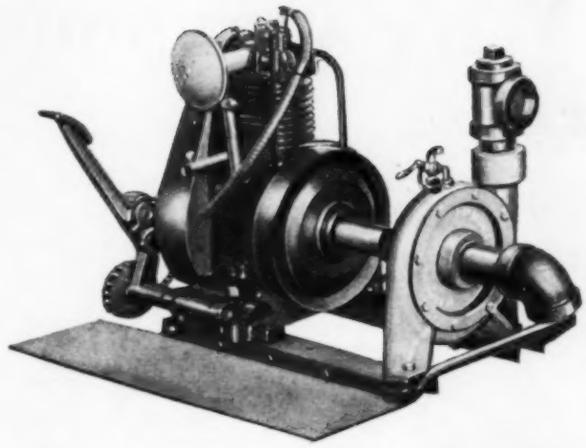
American Steel & Wire Company

Subsidiary of United States Steel Corporation

208 S. La Salle Street, Chicago — 30 Church Street, New York

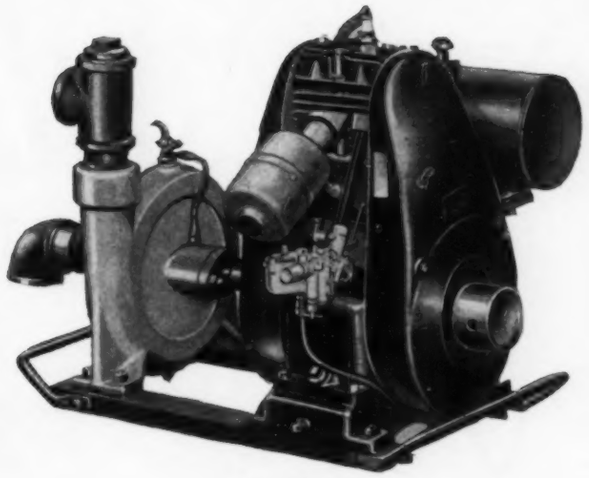
Other Sales Offices: Boston Cleveland Worcester Philadelphia Pittsburgh Buffalo Detroit Cincinnati Baltimore Wilkes-Barre St. Louis Kansas City Minneapolis-St. Paul Oklahoma City Birmingham Atlanta Memphis Dallas Denver Salt Lake City

U. S. Steel Products Company: San Francisco, Los Angeles, Portland, Seattle *Export Representatives:* United States Steel Products Co., 30 Church St., New York



Size 150

Suction and discharge 1½ in. standard pipe threads. ½ hp. air cooled engine. Foot starter. Heads—20 to 30 ft. Capacities—350 to 2,500 gals. per hour. Weight of complete unit, 105 lbs.



Size 200

Suction and discharge 2 in. standard pipe threads. 1½ hp. air cooled engine. Rope starter. Heads—20 to 55 ft. Capacities—500 to 8,250 gals. per hour. Weight of complete unit, 180 lbs.

NOW The Portable UNIPUMP

for draining cellars, trenches, ships, catch basins, conduit manholes, cofferdams, quarries, etc.

Here's a world beater in a light, compact, portable pump that handles either clean or dirty water. Built in two sizes with capacities up to 8,250 gals. per hour. Direct connected to gasoline engine—air cooled. Cannot tip over when starting. Convenient carrying handles. All steel, electric welded base.

Easy to pick up and carry. Can be moved from place to place in a Ford car. No gaskets or diaphragms to renew. Handles up to 25% solids without clogging. Engines start easy. Press a button to stop. No filler blocks between pump and base. Centrifugal, open impeller type of pump.

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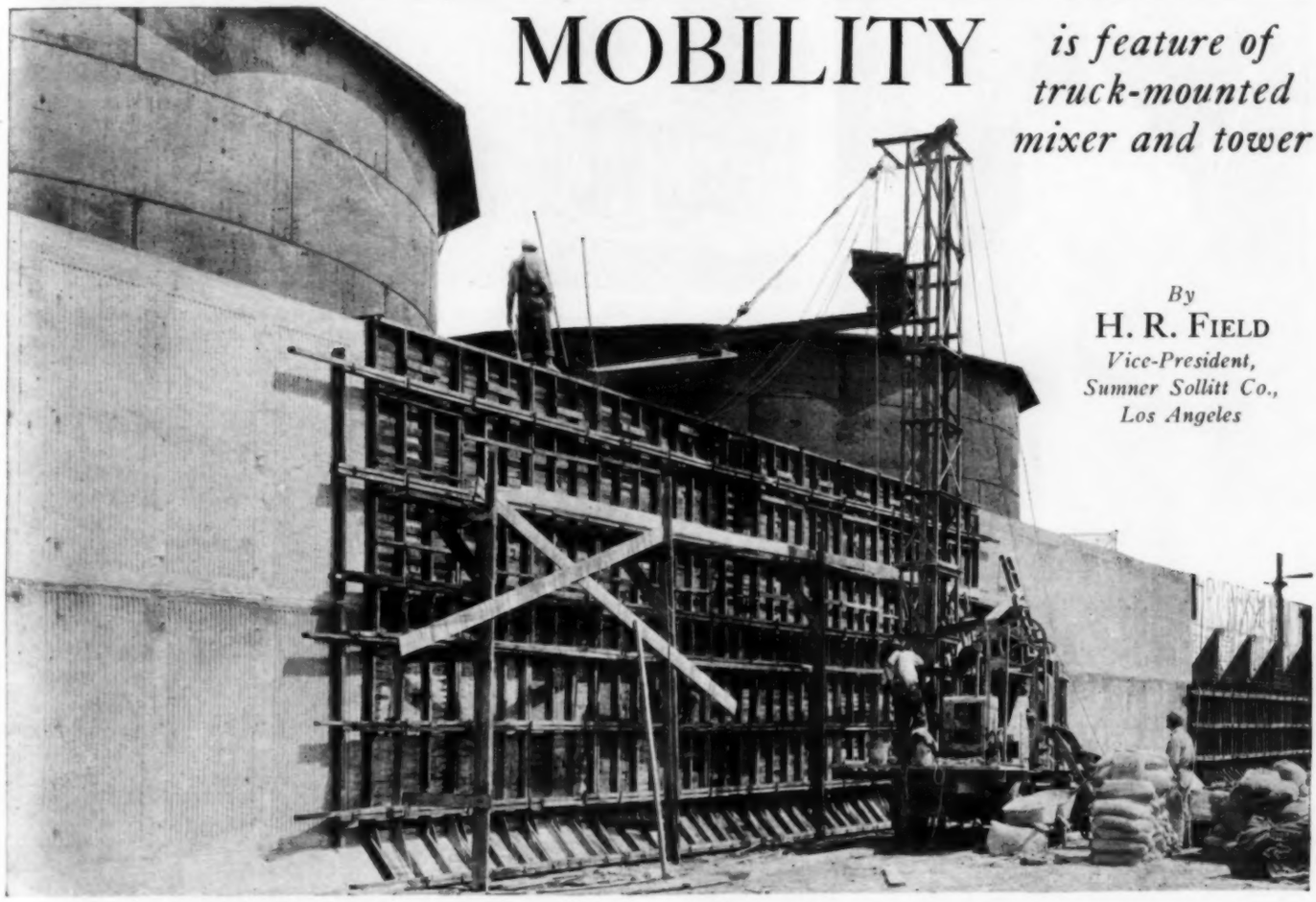
A McGraw-Hill Publication—Established 1919

ROBERT K. TOMLIN, *Editor*

Volume 11 | NEW YORK, SEPTEMBER, 1929 | Number 9

MOBILITY *is feature of truck-mounted mixer and tower*



By
H. R. Field
Vice-President, Sumner Sollitt Co., Los Angeles

IN BUILDING a 20-ft. retaining wall, 2,200 ft. long, for the Rio Grande Oil Co. at its Long Beach Harbor terminal, several unusual methods were used by the Sumner Sollitt Co., contractor. The wall was designed with keyed asphaltic expansion joints 60 ft. apart. It was desired to have certain portions of the wall completed ahead of others so that it was necessary that the concreting plant should be easily moved around to different positions on the site.

Concrete for the foundations was poured with a paving mixer. Aggregate was received in batched trucks and concrete deposited by the mixer directly into the foundation. The concrete for the wall was placed with a 7-ft. Bremer mixer and a steel hoisting tower, both mounted on a motor truck. The mixer discharged the concrete into a hoist skip serving chutes leading directly to the forms, no wheeling or scaffold being necessary.

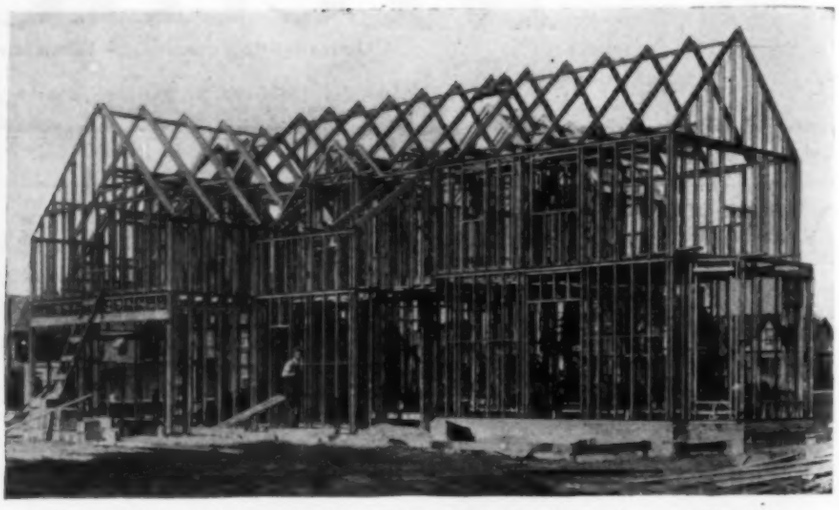
An innovation in form work was the use of corrugated iron on the wooden panels so that the face of the wall has a paneled effect, the corrugated iron slightly recessing the panels. Panel forms were used throughout, being held together at the bottom with Bosco band iron clamps and above with the Willard Bulldog clamps. Sufficient forms were provided so that 60 lin.ft. of wall was concreted daily.

The wall encloses approximately 6 acres, in which are located a number of large gasoline and oil tanks. The wall is designed to resist a pressure of about 17 ft. of oil in case an accident should let the oil escape from the tanks. The wall is 2 ft. 8 in. thick at the bottom and 8 in. at the top. It has a foundation 12 ft. 8 in. wide and has counterforts 15 ft. on centers on the back of the wall. The proportions of aggregate and cement were determined by the Osborne Testing Laboratories, using 3% of Calatom admixture.

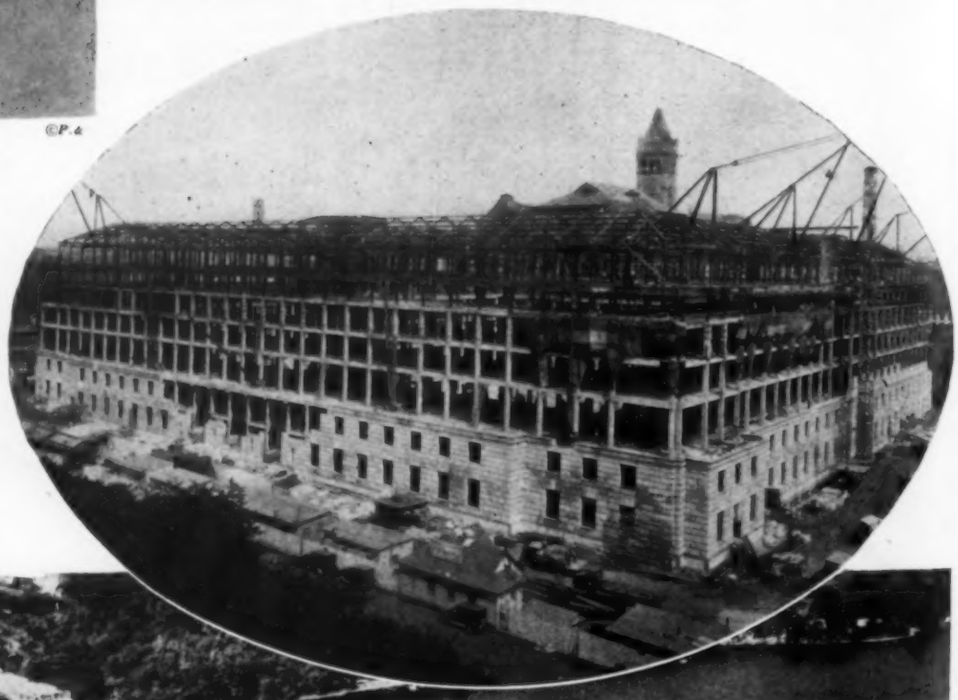
The work was performed under the direction of J. J. Downey, chief engineer of the Rio Grande Oil Co., W. C. Farquhar being directly in charge of the work. The writer had charge of the work for the Sumner Sollitt Co., H. J. Schaufele being superintendent at the job. W. A. Bremer of Los Angeles built the mixer and assembled the combined mixing and hoisting uni

This Month's

TO GUIDE TRAFFIC. Police Commissioner Grover Whalen, New York City, starts marking of 5½-mile traffic line on Ocean Parkway, Brooklyn.



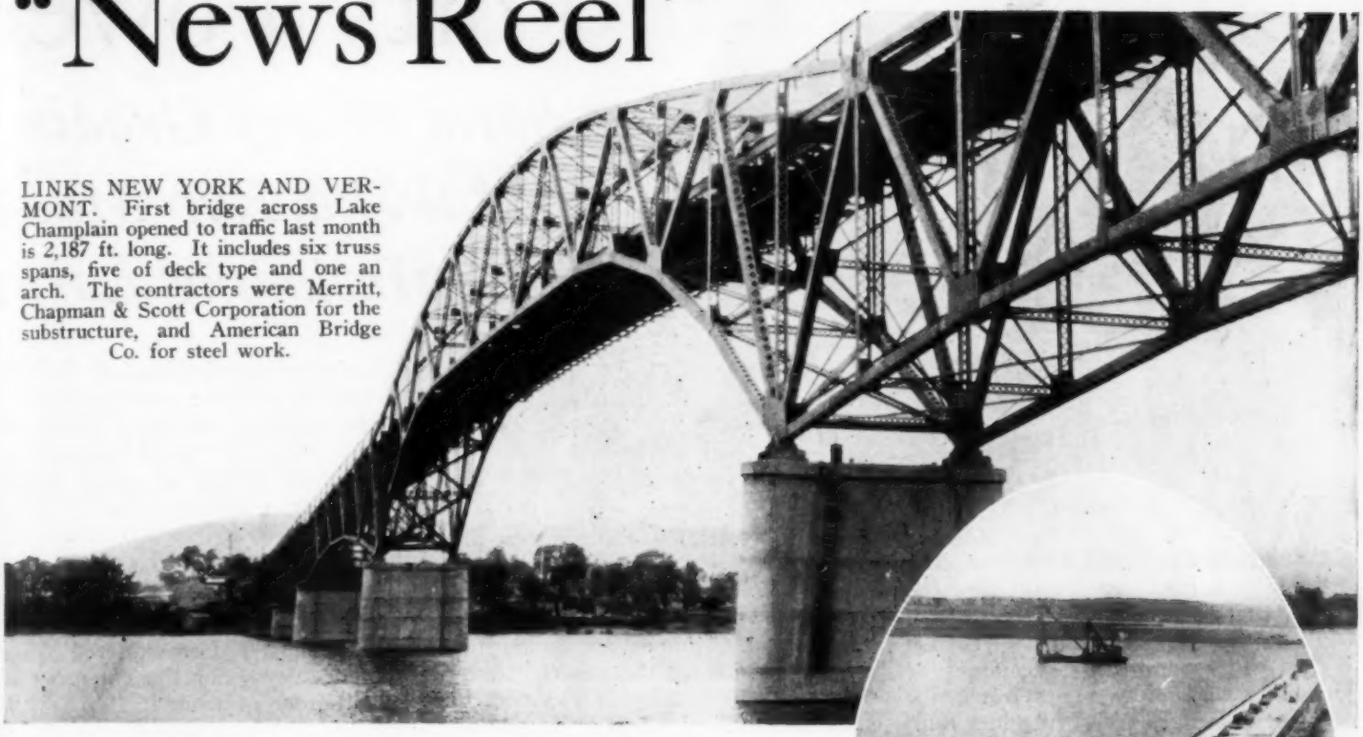
ALL-STEEL FRAME for 40,000-cu.ft. house in Indianapolis, erected as demonstration by Steel Frame House Co., Pittsburgh. View shows progress twelve days after start of steel erection.



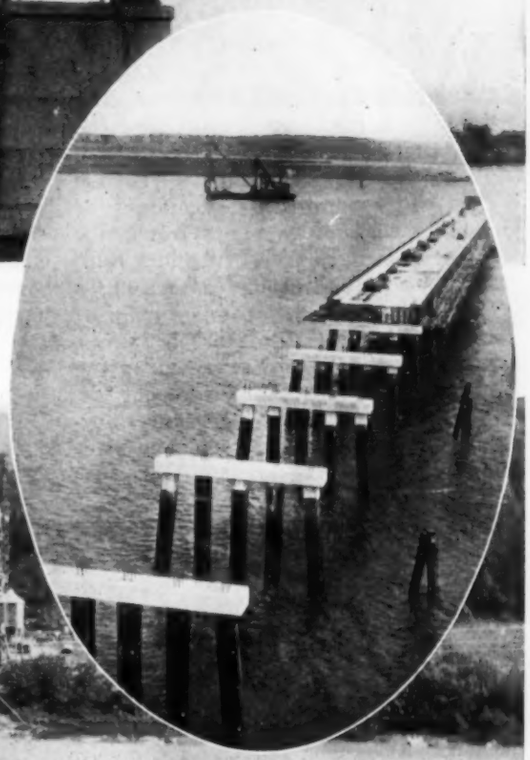
TO HOUSE YOUR INCOME TAX RETURNS. View shows progress made by James Baird Co., contractor, on new Internal Revenue Building, Washington, D. C.

RARITAN RIVER BRIDGE being completed at New Brunswick, N. J., to carry highway traffic. Parker & Graham, Inc., contractors, concreted arch ribs by using assembled sections of steel centering. Structure is 1,902 ft. long and provides roadway 50 ft. wide flanked by 6-ft. sidewalks.

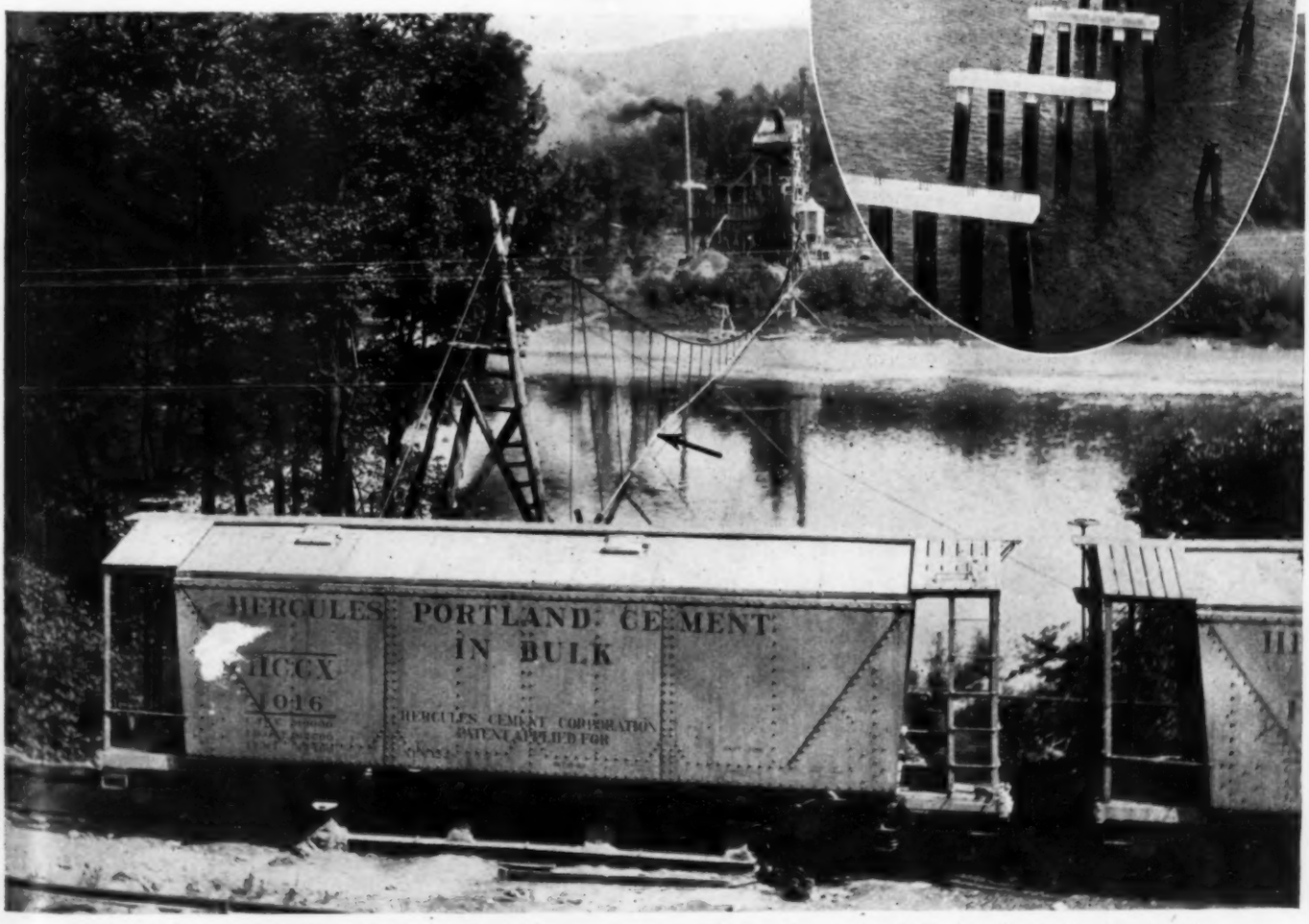
"News Reel"



LINKS NEW YORK AND VERMONT. First bridge across Lake Champlain opened to traffic last month is 2,187 ft. long. It includes six truss spans, five of deck type and one an arch. The contractors were Merritt, Chapman & Scott Corporation for the substructure, and American Bridge Co. for steel work.



CONCRETE PILE TRESTLE *(right)* for Rigolets highway bridge, Louisiana. Forms for deck girders are supported on steel I-beams between pier caps. Contractors are Frederick Snare Corporation for substructure, and Nashville Bridge Co. for superstructure.



PNEUMATIC CEMENT CARRIER. For highway contract at Warren, Pa., the York Engineering & Construction Co. delivers cement, shipped in bulk, across river to mixing plant in 3-in. pipe line suspended from cable. Bulk cement is pumped from railway cars by Fuller-Kinyon units.

Forty Power

to Speed Heavy Grading P. & W. Va. Ry. Many Including Large

©L. W. Hoon

LOADING HOLE, drilled with well rig, with black powder and dynamite.

WITH a fleet of 40 power shovels and 14 subcontractors mobilized and set to work on heavy grading operations, involving cuts running to depths of 95 ft. and fills 80 ft. high, the Vang Construction Co., of Pittsburgh, has organized for speed in building in Pennsylvania, for the Pittsburgh & West Virginia Railway, the Connellsville extension, a cross-country route 38 miles long, of which 17½ miles is included in the section covered by the accompanying notes. The extension, connecting the P.&W.Va. with the Western Maryland Railway will make possible a direct route from the Middle West to the port of Baltimore. Starting at Pierce the line extends south and then swings east to cross the Monongahela River near Bellevernon, continuing to Ohio City, Pa., the terminus of the present construction. Under other contracts the line will be continued to Connellsville.

Grading—In addition to heavy cuts, some of them 95 ft. deep and involving, in the aggregate, nearly 3,000,000 cu.yd. of excavation, the work on the present 17½ miles of the extension includes 12 viaducts, 3 arches, 2 road crossings, 12 box culverts, 7 pipe cradles and 1 tunnel, all calling for extensive plant for the mixing, transportation and placing of concrete, in addition to the heavy excavating equipment required for the grading operations.

The Vang organization has divided the work into three sections and is handling most of the deep cuts with its own forces. To speed progress by attacking the job at as many points as possible fourteen subcontractors have been assigned to the remaining grading operations. All grading was let on an unclassified basis.

Job Conditions—The general character of the material encountered along the right-of-way for the extension is an overburden of about 15 ft. of earth, underlaid with rock consisting of shale, bedded sandstone, limestone and coal. Following stripping operations with steam shovels the rock is drilled, loaded and shot, well-drill rigs putting down holes 20 ft. deep on the heavy cuts. Haulage of spoil is done by several types of equipment, including dinkey locomotives and cars, motor trucks, tractors and crawler-mounted wagons. Especially during the spring rainy season, when the ground became soft, the contractor reports better success with dual pneumatic-tired trucks than with trucks equipped with solid rubber tires.

At one place, where the cut is 85 ft. deep, a 2-yd. Marion shovel, supplemented by a ¾-yd. Erie unit, was installed. Haulage was handled by a

©L. W. Hoon

SPRINGING A HOLE *(in oval)* preparatory to loading for blasting.

TRESTLE used for making a high fill—one of the methods used by the contractor.

BLAST IN HEAVY CUT. Vertical holes 18 to 20 ft. deep. Total charge 3,420 lb. of dynamite.

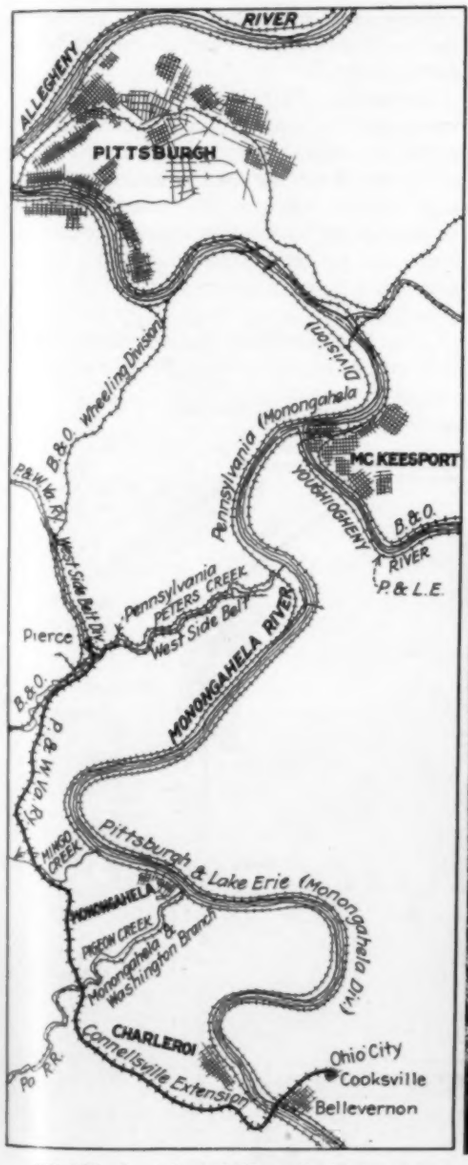
Shovels Mobilized

on Connellsville Extension of Concrete Structures, Bridge, Being Built

fleet of motor trucks until the top cut was removed. Standard-gage railway equipment was then trucked to the site, including 20-yd. Western air-dump cars, Nordberg track shifter. Porter dinkey locomotive and Jordan spreader. A standard-gage trestle was built over a nearby valley to make a waste fill. Underneath the top 20 ft. of the cut, rock was encountered and two Keystone drill rigs were set up to put down blast holes 20 ft. deep.

BULLDOZING a fill with a tractor. ©L. W. Hoon

A 95-ft. Cut—One of the largest grading operations was at another point where the cut ran to a depth of 95 ft. Here two 1½-yd. Marion shovels, operated from both sides, loading into Athey crawler-mounted wagons, hauled by Caterpillar tractors, pneumatic-tired trucks and Linn tractors. Dinkey equipment was installed later, including two 20-ton Porter locomotives and twenty-four 4-yd. Western dump cars. Spoil from this cut was used to make an 80-ft. fill on the right-of-way. During a dry spell, when water could not be had from a nearby stream, it was necessary to pipe water for the steam shovels a distance of 9,000 ft. from the nearest town. The installation for this purpose included a portable Domestic pump powered by a two-cylinder Le Roi gasoline engine. After rock was struck in this cut Keystone outfits,



PLAN of section of Connellsville extension now under construction for 17½ miles from Pierce to Ohio City.

ROCK CUT, 74 ft. deep, being excavated in six lifts by S. G. Polino, subcontractor of Fairmont, W. Va. Two 6-in. well drills put down the holes for blasting. The cut contains 230,000 yd. of earth and 100,000 yd. of rock.

CENTRALLY-MIXED CONCRETE is hauled from Monongahela to all structures being built on the 17½-mile section, except the piers of the Monongahela River Bridge. Some of the trucks are equipped with bath-tub bodies which have no angles. Concrete is not mixed or agitated in transit.

gasoline powered, drilled the necessary blast holes, which were shot with Atlas explosives. Portable air compressors—Sullivans and Ingersoll-Rands—served drills used in connection with the blasting of boulders too large to be handled by the shovels.

The accompanying tabulation shows the large amount of power shovel equipment used on the grading operations, involving close to 3,000,000 cu.yd. on the 17½-mile portion of the line covered by present contracts.

NUMBER AND MAKE OF POWER SHOVELS

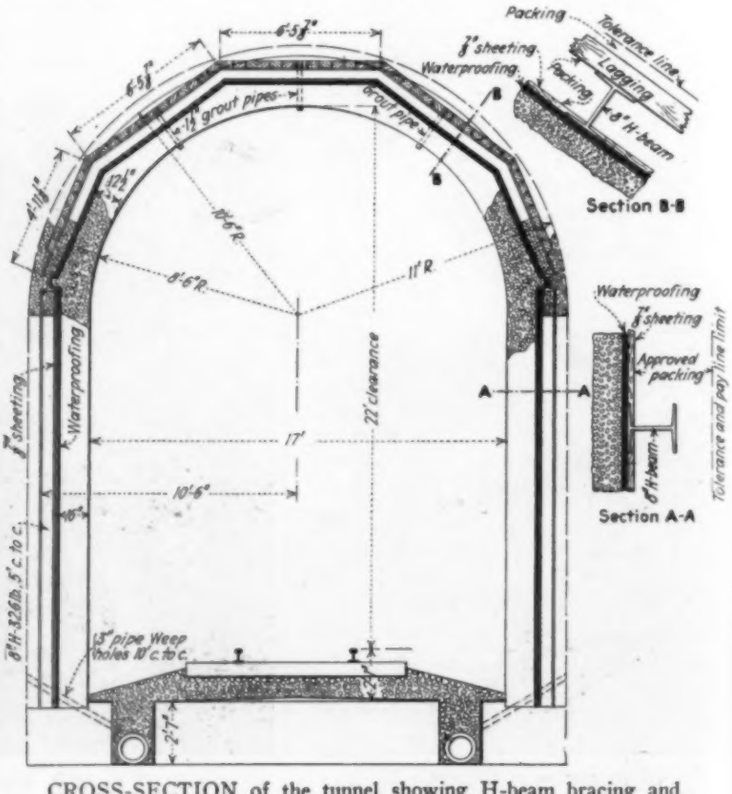
Erie	11	Marion	5
Osgood	8	Northwest	3
Thew	5	Koehring	3
Bucyrus	5	Total	40

Concrete Structures—For the various reinforced concrete structures on the 17½-mile section of the extension, including the Monongahela River bridge, the Vang Construction Co. installed three central concrete plants, each equipped with a Smith tilting mixer (two, 2-yd. and one, 1-yd.). The plants were located as follows: (A) at Monongahela; (B) at Bellevernon (river crossing); (C) on boat in Monongahela River.

For the arches, abutments, viaducts and box culverts the central plant at Monongahela delivered mixed concrete to motor trucks operating on hauls of from 2 to 12 miles. To prevent segregation during these trips, increase the workability of the concrete and facilitate its discharge from the trucks, an admixture was introduced into the concrete mix. On this point L. E. Goerder, superintendent for the contractor, makes the following comment: "The maximum haul for the motor trucks delivering concrete from the central mixing plant was 12 miles. When we started to haul concrete in regular trucks we had difficulty in getting it to slide out of the beds of the trucks and we tried 3 per cent of Celite, which we found to be just what we wanted. We are now experiencing little difficulty in getting the concrete to move out of the trucks freely."

A fleet of 20 trucks—mostly 3½ ton units—all equipped with pneumatic tires for traveling speeds of 20 to 30 miles per hour, serves the central mixing plant. Some of the trucks were equipped with bath-tub shaped bodies, with all corners rounded to aid the free discharge of concrete from them. During July the average daily output of the Monongahela mixing plant was 225 cu.yd. of concrete. For the work

AIR SHOVEL loading rock inside tunnel which is being driven by the Faulconer Construction Co.



CROSS-SECTION of the tunnel showing H-beam bracing and details of H-beams and waterproofing.

now in hand the concrete required (exclusive of the Monongahela River bridge) is 30,000 cu.yd.

Road Crossings—One of the road crossings involved special engineering and construction problems where an abutment was located over an old mine and adjacent to a slate pile 100 ft. high. Here the foundation had to be carried to a depth of 40 ft. to reach the floor of the old mine. To safeguard the workers from possible slides of the slate pile a steel cofferdam was constructed in the foundation. Excavation for the abutment footing was taken out by muck buckets operated from a stiff-leg derrick.

SUBCONTRACTORS ON GRADING

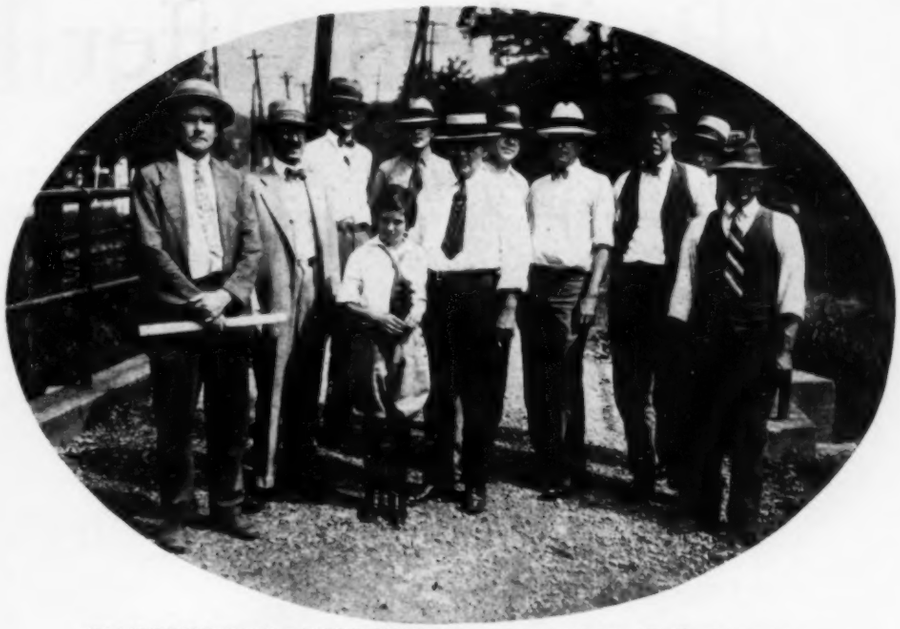
Hardy Construction Co.
S. T. Brotemarkle & Sons
Sam Polino
R. H. Cunningham & Sons
Freeland, McHale & Patten
Corrado & Galiardi
Yost Construction Co.
James P. McCabe
Rankin Construction Co.
Stein & Geisel
Faulconer Construction Co.
C. M. Hall
E. N. Jones
Donora Construction Co.

Viaducts—Of the dozen viaducts included in the work, one, at Peters Creek, is 800 ft. long. Another, at Mingo, crosses a highway at a height of 55 ft. A third viaduct, on 26 sets of pedestal piers, spans Mingo Creek at an elevation of 185 ft. and a fourth on a curve, crosses Pigeon Creek 186 ft. above water level.

Where the right-of-way crosses small streams, reinforced concrete box culverts are built. One of these, under a 130-ft. fill, is 450 ft. in length.

River Bridge—The crossing of the Monongahela River at Belle Vernon calls for a 2,600-ft. bridge of 18 different spans, varying in length from 40 to 450 ft. The steel superstructure will be carried by two abutments, seven piers and ten sets of pedestals. Two of the pedestal sets and all of the piers will rest on circular caissons sunk 50 to 60 ft. deep. The river plant required for the bridge operations comprises three derrick boats, one compressor boat and one concrete mixing boat.

Personnel—For the Pittsburgh & West Virginia Railway, work is under the general supervision of H. H. Temple, chief engineer. In charge of field operations for the Vang Construction Co. is L. E. Goerder, general superintendent. F. L. Riddle is construction engineer, and W. C. Kline assistant construction engineer for the railway company.



CONSTRUCTION PERSONNEL *(from left to right)*—R. B. Stone, resident engineer, P. & W. Va.; H. H. Temple, chief engineer, P. & W. Va.; L. E. Goerder, general superintendent, Vang Construction Co.; R. S. Anderson, assistant engineer, P. & W. Va.; George Vang, president, Vang Construction Co.; W. C. Kline, assistant engineer of construction, P. & W. Va.; L. A. Reinhard, Secretary, Vang Construction Co.; H. G. Quail, concrete superintendent, Vang Construction Co.; D. L. Gault; S. G. Polino.

©L. W. Hoon

SETTING first two sets of H-beam arch bracing at portal of tunnel.

ABUTMENT *(in oval)* of deck truss bridge, extending through abandoned coal mine to reach foundation.

GAS ELECTRIC SHOVEL loading spoil into tractor truck on the grading section of James P. McCabe.

Builders Offer Protection

Safety Principles, Applied on Job, Safeguard Both Workers and Public

1 LADDER SAFEGUARDS *(below)* used by R. F. Jones Co., contractor on construction of Horace Bushnell Memorial Hall, Hartford, Conn. Upper view shows wire tie and lower view wood cleats to prevent side slipping.

PREVENT ACCIDENTS IN CONSTRUCTION

ON LETTERS the Associated General Contractors use this safety sticker.

2 WIRE SCREEN *(above and in oval)* around material hoist tower on alteration to department store of R. H. Macy & Co., Inc., New York City, prevents falling fragments from injuring pedestrians on crowded Thirty-fourth Street. Marc Eidlitz & Son, Inc., contractors.

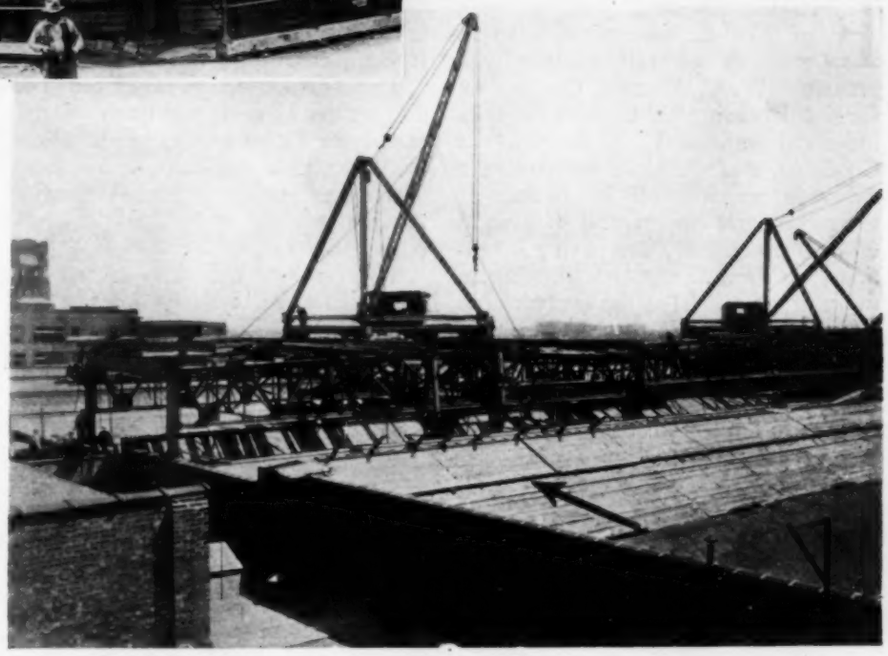
LET US HEAR FROM YOU

If you are helping the cause of accident prevention by actually applying safety principles on YOUR work, mail photos of devices or methods to the Editor for use in a forthcoming issue of *Construction Methods*.

from Construction Hazards

COVER DESIGN used by Turner Construction Co. on safety issue of publication for its own employees.

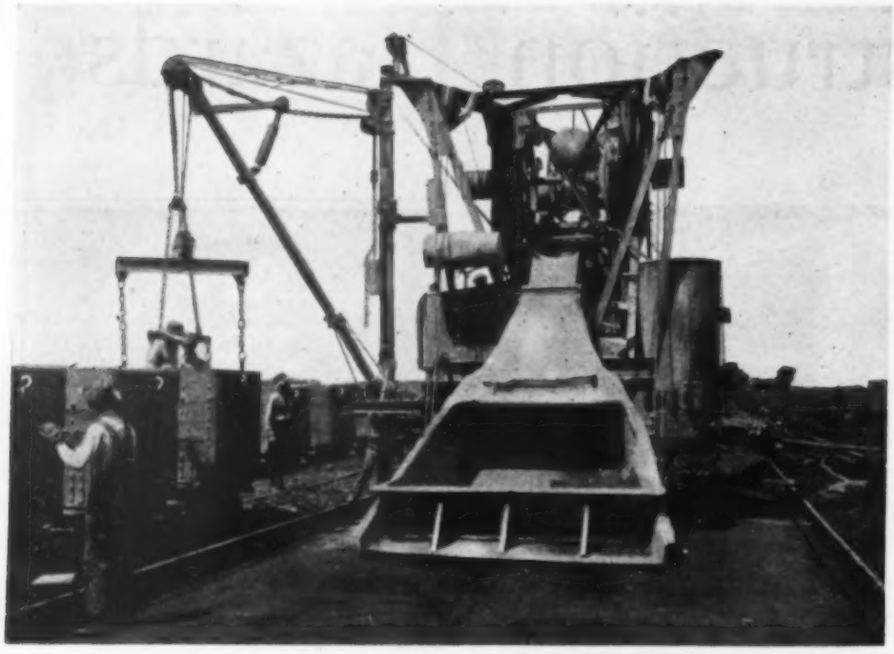
3 SCAFFOLD PROTECTION *(above)* as employed by the Ferro-Concrete Construction Co. on the Union Central Life Insurance Co.'s annex, Cincinnati. Overhead cover protects workers and foot boards prevent objects from rolling off scaffold floor. Note also sidewalk cover supported by metallic pipe bracing.



4 TEMPORARY PLANK ROOFING *(right)* was placed by Turner Construction Co. during reconstruction of Western Electric plant, Chicago. Wood cover prevented accidents due to dropping of small tools or material on workers below.

5 GUARD RAILS *(left)* protect floor openings and ladder landings on new buildings under construction by the Morton C. Tuttle Co., Boston, contractor.

Paving 8,000 FT.



NINE-SACK MIXER is fed materials for 1:2:3 mix from wood batch boxes. Trains are shunted over a run-around track at the mixer.

EIGHT thousand feet a week of 9-7-9-in. concrete slab, 18 ft. wide, is the fair weather program the W. C. Meneely Co. has set for its Koehring 32-E-paver and its industrial outfit on U. S. Route 24, at Goodland, Ind. Ample equipment, a subgrade prepared far in advance of the mixer, and employment of a night crew to make ready for paving operations are three factors contributing to rapid progress. That the contractor is not unreasonable in expecting a rate of 8,000 ft. a week is indicated by the first week's record, which shows 7,500 ft. completed in 5¼ working days.

The contract section under construction by the Meneely Company extends east from 2½ miles west of Goodland to Wolcott, a distance of 17 miles. The mixer started at the west end of the job, whence it will continue east until it finishes.

Two set-ups of the material-handling plant are being used. The first of these is at Goodland, 2½ miles from the west end of the project. This plant will supply materials for the first 8 miles. It then will be moved to Remington, 4 miles from the east end, where it will serve the remainder of the job.

Materials Plant—The material-handling plant is equipped with two Johnson 120-ton bins and a Koehring gasoline crane operating a Blaw-Knox 1½-yd. bucket on a 50-ft. boom. Four Johnson weighing batchers, two under each bin, are spaced to discharge into four batch boxes simultaneously. The plant loads a fourteen-batch train in 4 minutes. Sand and gravel are received in hopper-bottom cars, which dump into pits beneath the track.

Cement is handled by a sub-contractor on a barrel price basis. The 1:2:3 mix for the 32-E paver takes 9 sacks of cement. A crew of five men truck the sacks out of railroad cars and pile them in alternate stacks of four and five sacks on the loading platform, clipping the wire ties. The loading operation for a fourteen-batch train requires about 4 minutes.

Industrial Railway — Industrial equipment includes six Plymouth 7-ton gasoline locomotives (five friction drive and one gear drive), 65 Western cars and boxes and 5½ miles of Lakewood 24-in. gage track. Stub switches for passing between plant and mixer are spaced according to the number of locomotives in use. A run-around is placed at the mixer.

The night-shift moves the run-

BURLAP is rolled on a manually operated reel which travels on the forms.

MIXER DRAGS HOSE (*right*). Extended pipe and ropes tied to hose make it unnecessary for a man to watch water-line connections when mixer moves ahead.

A WEEK

around and carries the forms ahead, leaving the job clear for the day force to proceed without delay from interfering operations.

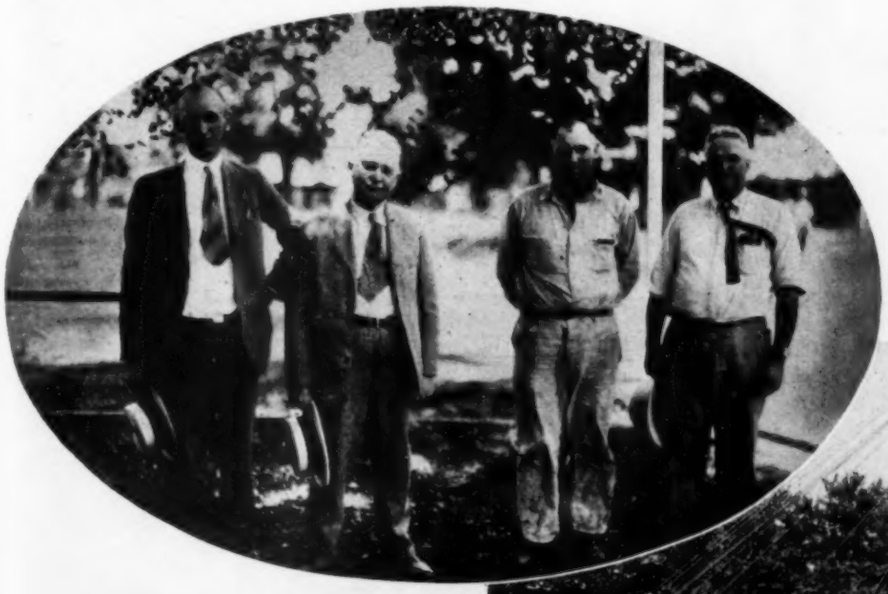
Rough Grading—Excavation is estimated at 61,605 yd. The W. C. Meneely Company is using a Stroud elevating grader, eight to ten trucks, three Caterpillar and one Cletrac 5-ton tractors, each tractor pulling a train of three Western 1½-yd. dump wagons. A subcontractor who is doing about 3½ miles of rough grading has two Caterpillar 10-ton tractors, eight Baker-Maney scrapers, and an Adams 12-ft. blade grader. One 10-ton gasoline roller serves both grading outfits.

Teams and slip scrapers, a Caterpillar 5-ton tractor, an Adams leaning wheel grader, a Lakewood subgrader, and a Fordson 3-ton roller are preparing the subgrade. The grader cuts the form trenches. A Fordson tractor was converted into the 3-ton roller by filling the rear wheels with concrete.

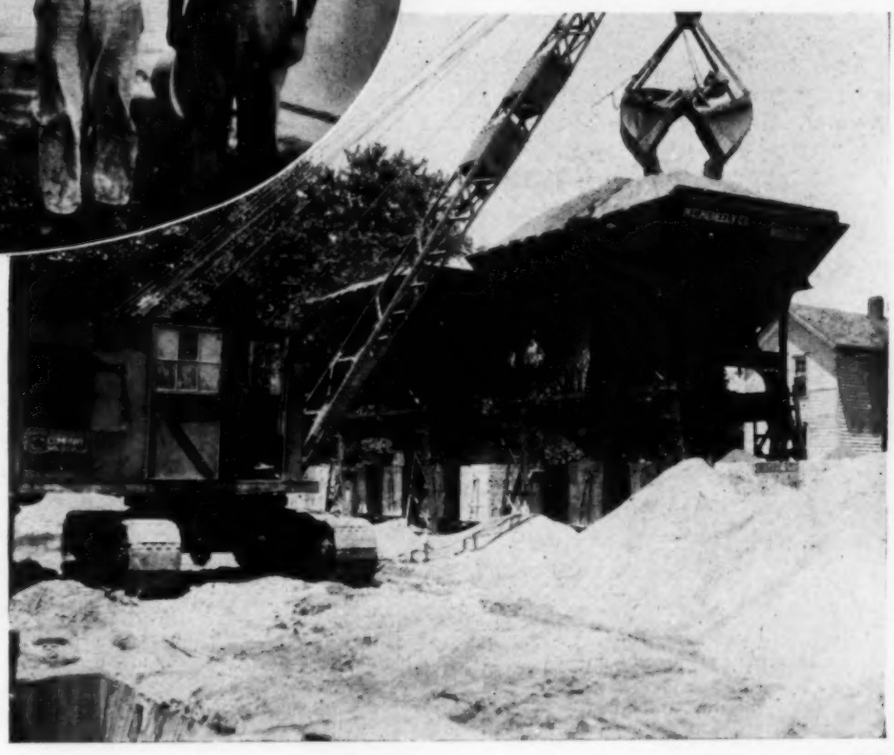
CEMENT-HANDLING CREW of five men loads fourteen nine-sack batches in four minutes.

Finishing and Curing — Although slab is being laid at the rate of 120 ft. an hour, a Lakewood finishing machine travels over the fresh concrete three times to finish the surface, running in high gear practically all the time. It apparently suffers no ill effects from this use. The slab is checked with a 10-ft. straight-edge before the final belting and again with a roller straightedge before it is covered with straw.

Burlap is rolled on a traveling reel which bridges the slab and runs on the forms. Final curing is by a layer of straw 3 in. thick, after wetting, which is kept wet for 10 days.



SUPERVISING OPERATIONS *(left to right):* W. C. Meneely and Bert Wills, partners in the W. C. Meneely Co.; Ben Woodhouse, superintendent, and H. L. Davies, project engineer in charge for Indiana Highway Commission



MATERIAL-HANDLING PLANT *(right)* equipped with two 120-ton bins and a 1½-yd. crane. Four batch hoppers are spaced to discharge into four boxes simultaneously.

Step-by-Step Lengthening

1 HOISTING FRAME, consisting of timber bents, one 7 ft. high to set on top of grade, and the other 10 ft. high for ditch side, are transported by motor truck and trailer to site of culvert extension.

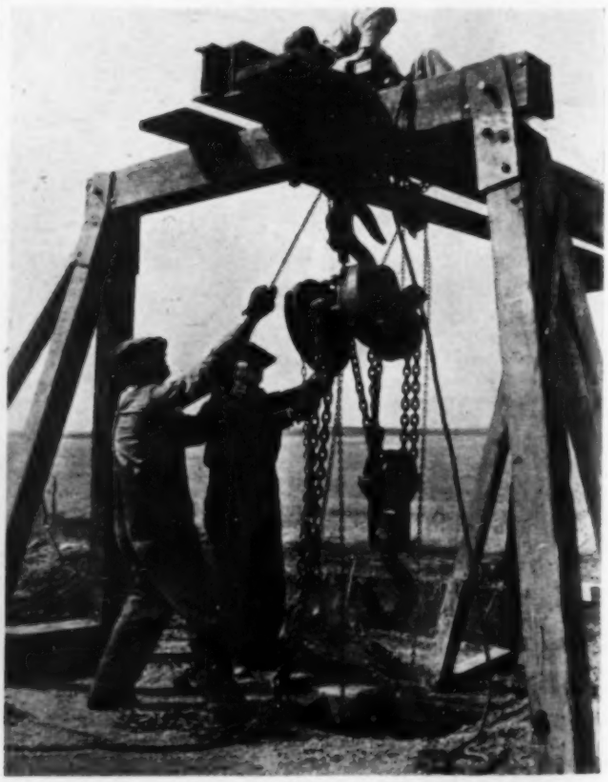
WHEN the Nebraska State Highway Department decided to increase the existing 20-ft. width of the Kimball-Harrisburg federal-aid road to 24 ft., an essential feature of the improvement work was the making of 4-ft. extensions to numerous culverts already in place. The method followed, as illustrated in the accompanying photographs, was to cut the original culvert pipe, move the concrete headwalls out the required distance and insert new sections of Armco corrugated metal pipe. The cutting was done with an oxy-acetylene torch.

Special equipment, designed for transport on a motor truck and trailer, was employed for extending the culverts. It consisted essentially of timber frame bents carrying an I-beam trolley hoist which easily handled the moving of the existing concrete headwalls and the placing of the new pipe sections. The original Armco culvert pipe, placed in 1918, was found to be in condition suitable for continued use.

Rex. H. Leberman was resident engineer for the state highway department on the project.

2 FRAMING of the bents is accomplished quickly with the aid of steel pins.

3 I-BEAM TROLLEY between the two bents is equipped with chain block hoist for handling existing concrete headwalls and new corrugated culvert pipe sections.



4 TWO I-BEAMS INSTEAD OF ONE are used to reduce weight and facilitate handling in field. I-beams are 8-in. 28-lb. units measuring 16 ft. long. Chain hoist is a 1-ton Yale unit weighing 650 lb.

Field Methods

Road Culverts

5 OUTFIT SET UP IN PLACE ready for moving culvert headwall similar to one shown in foreground of picture

8 UP SHE COMES! Timber block is placed under chain to shift center of gravity of headwall.

6 BEFORE LIFTING HEADWALL, iron bar with chain is thrust back of wall and a clevis is attached.

9 NEW SECTION OF CORRUGATED METAL PIPE slung from chains to trolley hoist is placed to extend old culvert 4 ft.

7 HITCH AROUND HEADWALL is completed and hook from hoist descends for raising.

10 BACKFILLING (*left*) around the extended headwall completes the job of culvert extension.

55 BELT CONVEYORS, IN SERIES,

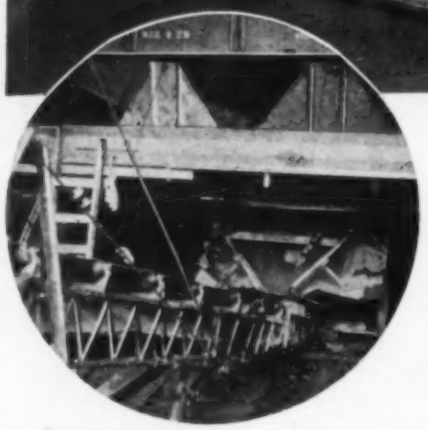
Deliver Wet Concrete and Dry Aggregate for

MERCHANDISE MART

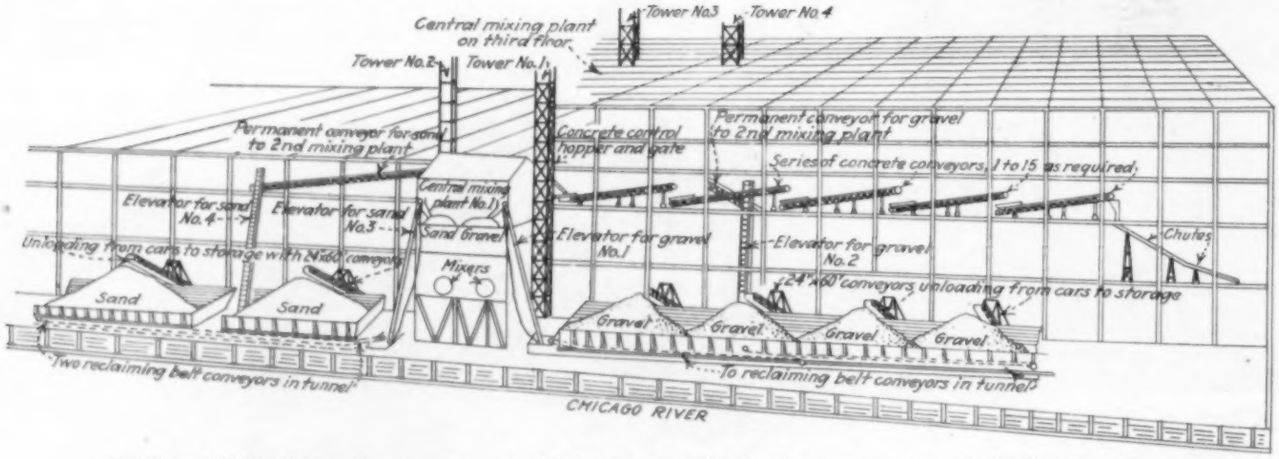
A DISTRIBUTING system made up of a series of 40-ft. belt conveyors is carrying concrete from two central mixing plants to all parts of the 4.4-acre floors in the Merchandise Mart, Chicago. The great area of the floors in this structure, which will be the largest building in the world, makes the problem of concrete distribution particularly critical. After Bruce A. Gordon, superintendent in charge of construction, had studied the application of various types of equipment to the concreting problem, John Griffiths & Son Co., the builders, settled upon two central plants, each equipped with two mixers and two towers, and a system of electrically-driven Barber-Greene belt conveyors as the most flexible, efficient, and economical combination of units adapted to needs on the building. Of the fifty-five belt conveyors used on the job, forty-four handle wet concrete and eleven sand and stone.

The Merchandise Mart has the largest total floor area and the greatest cubical content of any building, anywhere. It occupies a block bounded on three sides by streets and on the fourth by the Chicago River. The plan of the building, which is carried upward unchanged for eighteen floors, is a trapezoid with a depth of 326 ft. between parallel sides 724 ft. and 573 ft. long. A two-story pent house and a six-story tower rise above the roof of the main structure.

Big Concrete Yardage—The building, which rests on 452 concrete piers sunk by the open caisson method about 80 ft. below the ground surface, has a structural steel frame fireproofed with concrete, concrete joist floors, and brick and hollow-tile walls faced with limestone and terra cotta. As the base-



CENTRAL MIXING PLANT NO. 1 is located on river side of Merchandise Mart where storage space also is provided for sand and gravel. *(At left)* HOPPER-BOTTOM CARS discharge aggregate into boot of cleated belt conveyor.



PLANT SET-UP, illustrating arrangement of belt conveyors for handling aggregate and distributing concrete.

ment level is to be occupied by eight tracks and platforms of the Chicago & Northwestern Railway freight station, column spacing below the first floor is irregular, and the first floor has numerous heavy girders transferring loads from the upper stories to the columns below. The first floor required about 14,000 cu.yd. of concrete; the floors above take approximately 6,000 cu.yd. each. A total of 190,000 cu.yd. is needed for the entire structure, including foundations. About 6,800 tons of reinforcing steel and 48,000 tons of structural steel are going into the building.

The distributing method was the factor governing the design of a plant to place these great quantities of concrete over the numerous floors of wide area. Use of hand carts would have required a number of towers from which the concrete could be pushed by men. More towers would have meant more mixers unless a means, probably expensive, of transporting concrete from the mixers to the tower buckets was substituted. The use of a chuting system from a tower was made impracticable by the presence of the structural steel frame, which would have destroyed the utility of this type of distributing equipment.

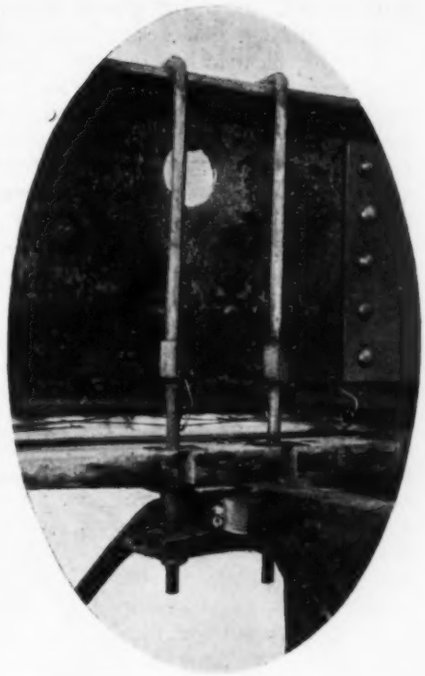
Mixing Plants—The first mixing plant, which furnished concrete for the caissons, was erected on the bank of the river. As described in the February issue of *Construction Methods*, page 25, boat loads of cement were shipped to this plant and were pumped by compressed air to the storage bins. The 5,300-bbl. bins of the plant were built to take a boat load of cement. Aggregates were delivered by rail.

Since the completion of the foundations, all concrete materials have been delivered in cars on tracks in the basement. A second mixing plant has been installed at the first floor level. Both plants receive sand and gravel from storage piles between the river and the building. Cement is pumped pneumatically from the cars to the bins at each mixing plant.

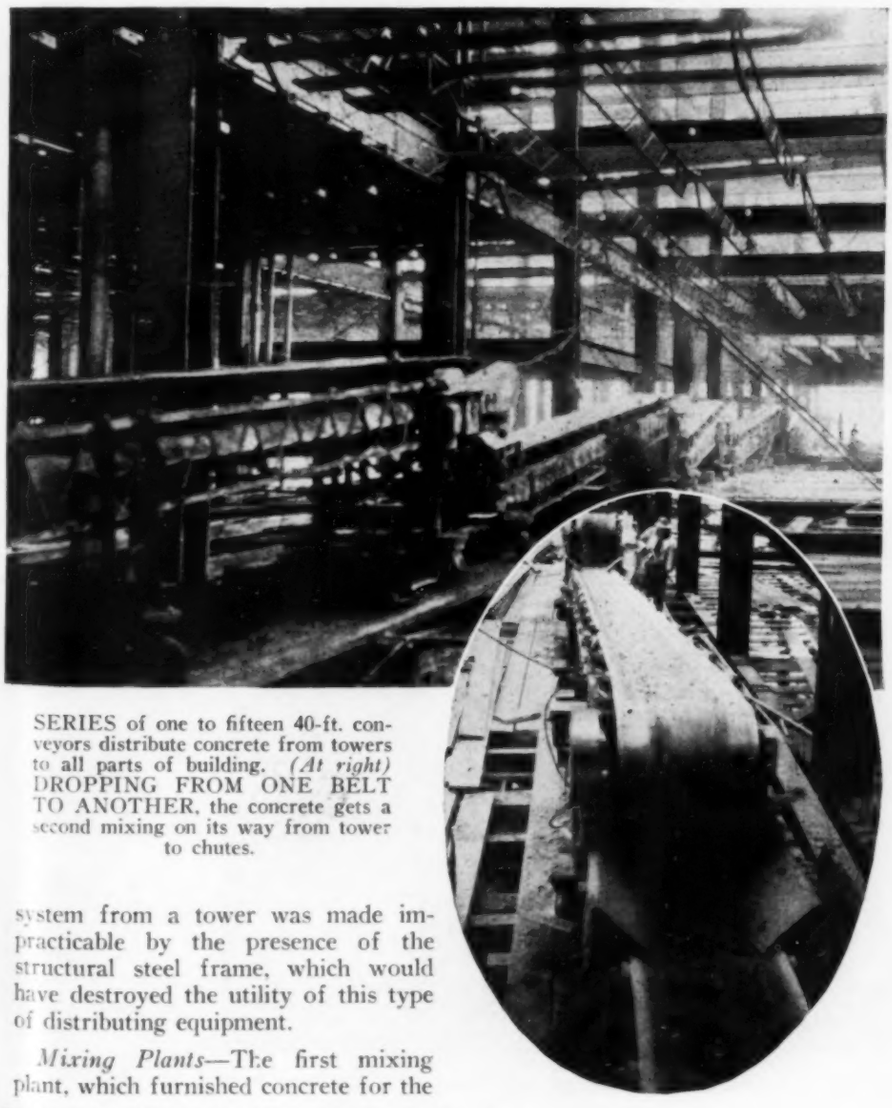
Cement is unloaded from cars by the same type of equipment used to unload cars of grain. Two cement-handling plants are situated along a track in the basement. At each of these, an electrically-driven automatic chain reversing hoist drum pulls the cement out of the car with a drag scraper on a line and dumps it into a hopper. From the hopper, the cement flows into a Fuller-Kinyon pump operating on 150 cu.ft. of air per minute at 80-lb. pressure. The pump raises the cement 70 ft. through a 4-in. pipe at the rate of 150 bbl. an hour. A two-way valve on the line from each of the two pumps enables them to feed either mixing plant. Two crews, comprising a total of three men, with the operating engineer, unload five or six cars in 8 hours, including time for switching and spotting. The plants can unload a maximum of eight cars in 8 hours.

Gravel storage along the river amounts to 2,500 yd., and sand storage to about 1,500 yd. Hopper-bottom cars dump into the boots of 24-in.x60-ft. cleated-belt conveyors, driven by 7-hp. motors. The conveyors deliver to stock piles. Four conveyors unload gravel and two handle sand. From 30 to 40 cars of aggregate are unloaded in a day. With the six conveyors and the two cement-handling outfits operating, eight cars of concrete materials are being unloaded simultaneously.

Two 100-ft. belt conveyors in tunnels under the gravel storage piles and two 60-ft. belts under the sand carry the aggregates to four 65-ft. bucket elevators, two serving each mixing plant. Aggregates for the interior plant are transferred at the tops of the elevators to belt conveyors on the second floor which transport them to the bins. Two 24-in.x120-ft. conveyors in tandem carry sand, and a



DOUBLE U-BOLT hooked over girder of structural steel frame supports expanded I-beam truss centering and bottom form for concrete fireproofing of girder. Bottom section of bolt is screwed out of sleeve when forms are stripped.



SERIES of one to fifteen 40-ft. conveyors distribute concrete from towers to all parts of building. *(At right)* DROPPING FROM ONE BELT TO ANOTHER, the concrete gets a second mixing on its way from tower to chutes.

24-in.x130-ft. conveyor delivers gravel.

Both mixing plants are equipped with two electrically-operated 1-yd. Koehring mixers fitted with the Koehring timing locks which are released automatically at the end of the 1½-min. mixing period. Sand, gravel, and water are measured by volume; cement, by weight. Each mixer is served by a tower equipped with a 1-yd. bucket. The interior towers are the Archer tubular type; those outside are Lakewood steel angle structures.

Placing Concrete — The conveyor system is placed on the centering of the floor above the one being poured, and concrete is distributed from the end of the conveyor series over a considerable area by chutes. Assuming that the second floor is being poured, the tower bucket dumps into a hopper on the fourth floor from which the concrete flows by gravity to the conveyor system on the third floor. At the end of the conveyor series chutes deliver the concrete to place on the second floor. Approximately half of each floor is poured from the riverside plant and half from the interior plant. The conveyors are capable of handling a yard a minute easily; they never cause any delay in concreting. Being on a floor above the pouring operations, they can be moved about to best advantage almost without any restriction.

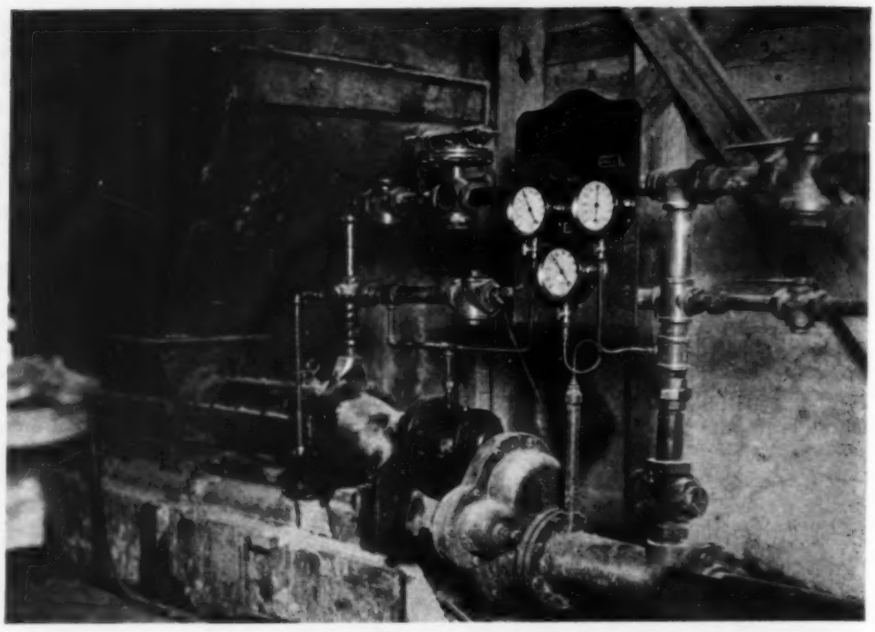
Series of from one to fifteen conveyors reach all parts of the building from the towers. Wires are strung with convenient plug outlets at all points where connections are needed to operate the electric motors. Concrete drops from the end of one conveyor to the hopper of the next. This dropping, in a long line of conveyors, practically amounts to additional mixing of the concrete in transit.

Two sub-contractors place the pans for the joist floors, each taking care of about half the building. One uses removable pans, while the other makes a permanent installation. Steel setters follow the pan men. Construction operations, from placing centering for forms to concreting, are divided among three floors. By stepping operations and distributing working forces and equipment over three floors, in such a way as to eliminate interference and keep the job at greatest efficiency, the contractor places 1,000 cu.yd. of concrete a day over 42,000 sq.ft. of floor.

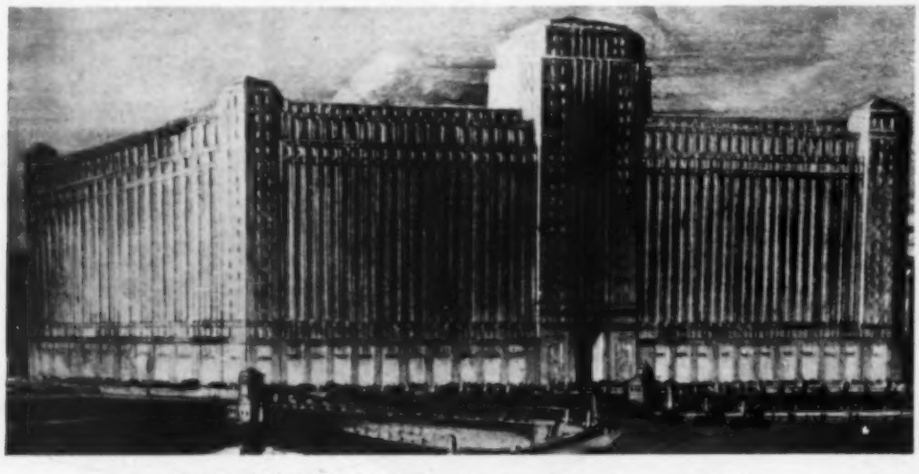
The size of the standard bay in the Merchandise Mart building is 20 ft.x19 ft. 10 in. Instead of the usual shored wood centering to carry the floor, John Griffiths & Son Co. is using five expanded I-beam trusses, weighing 161 lb. each, to support the forms in each bay. The steel centering weighs only one-fourth as much as wood, it is easy to erect and dismantle, and the salvage, of course, is 100 per cent. One of the photographs illustrates the method of hanging the expanded I-beams from the girders of the steel frame. Although the expanded I-beams are designed to carry the floor load without bending, the contractor keeps a row of shores under the center of the span while the concrete is being poured.

The general contractor at present has about 1,600 men on the payroll, and the sub-contractors are using about 400 workmen. It is expected that approximately 3,000 men will be employed in the construction of the building eventually.

The architects for the Merchandise Mart are Graham, Anderson, Probst & White, Chicago, and the general contractors are John Griffiths & Son Co. of the same city. Bruce A. Gordon is in charge for the contractors and George W. Allen is the architects' superintendent.



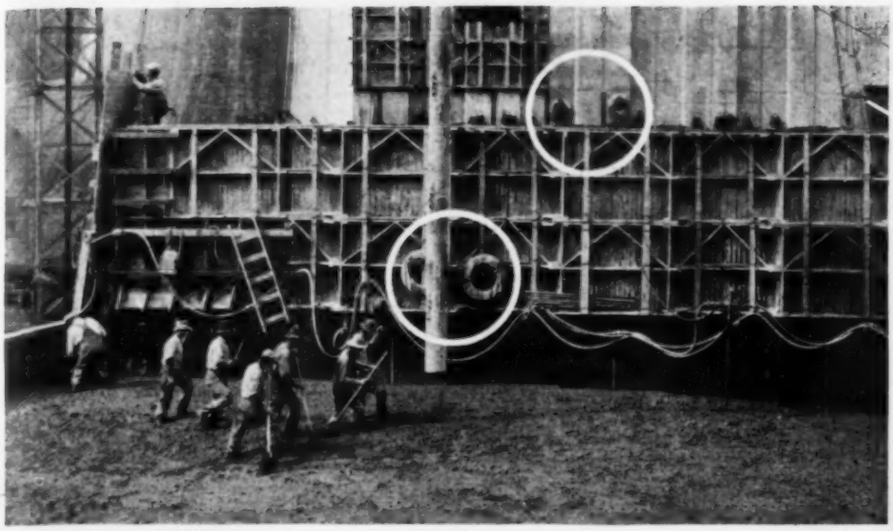
PNEUMATIC CONVEYING MACHINE which raises cement 70-ft. at the rate of 150 bbl. an hour. The small air pipe around the hopper is fitted with jets to agitate the cement, thus keeping it from clogging.



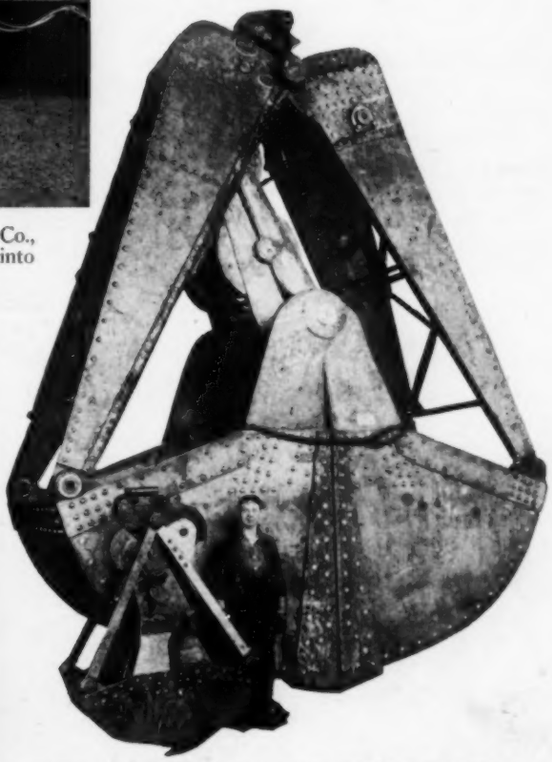
MERCHANDISE MART as it will appear when completed.

JOB ODDITIES

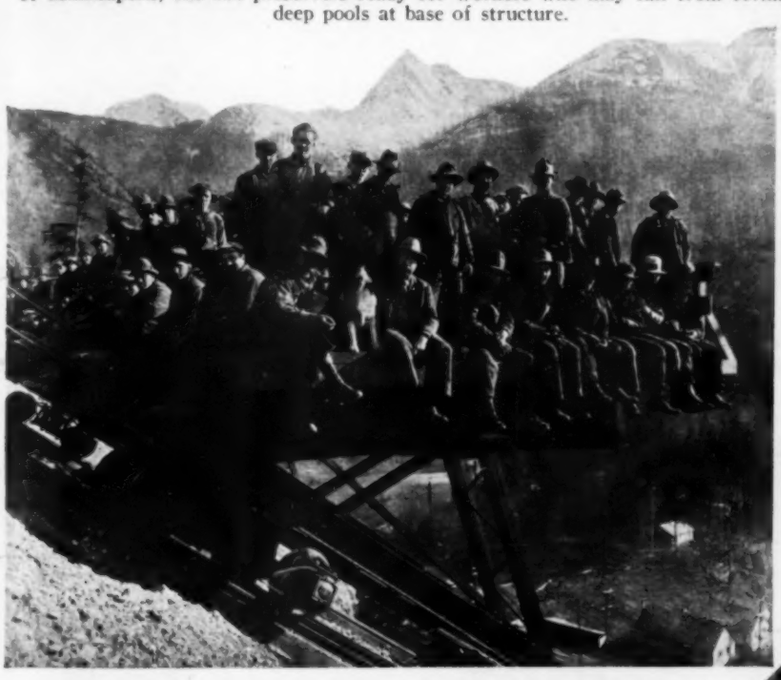
A Monthly Page of Unusual Features of Construction



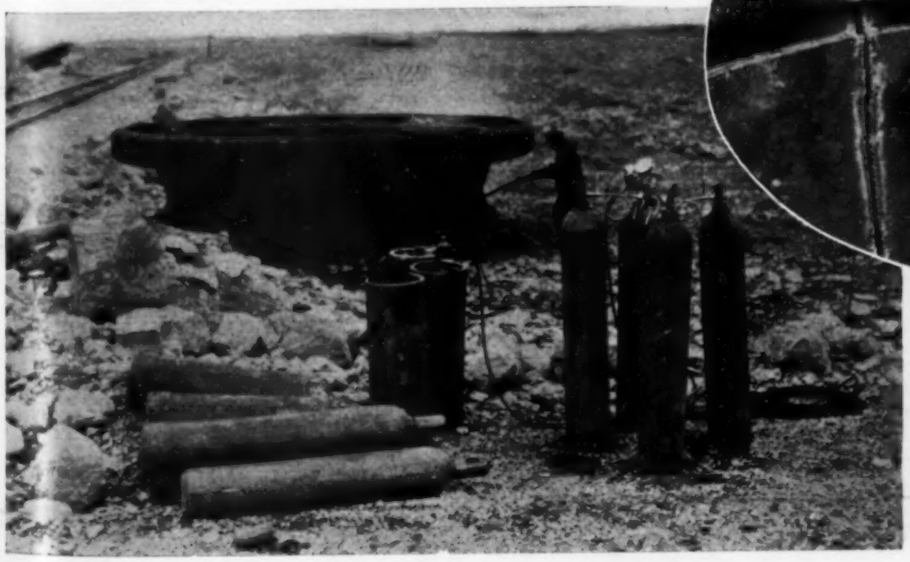
MAN OVERBOARD! On construction of Diablo dam, Seattle, Winston Bros. Co., of Minneapolis, has life preservers ready for workers who may fall from forms into deep pools at base of structure.



MUTT AND JEFF IN THE BUCKET FIELD. G. H. Williams Co. produces world's largest clamshell. Capacity 16½ yd. Compare with ⅜-yd. bucket at left.



SITTING PRETTY. Construction crew travels from camp to site of Diablo dam, Seattle, on funicular railway climbing canyon side on incline of 68 per cent. Vertical lift is 313 ft.



TOO HEAVY TO SHIP IN ONE PIECE — so the Michigan Limestone Chemical Co. cut this 50-ton cast-iron casting in two for removal as scrap with an oxyacetylene torch, under the supervision of J. W. Keyes of the Weldit Acetylene Co., Detroit. Two cuts were made, 6 to 18 in. deep and 6 ft. long. Pressures were 60 to 90 lb. for oxygen and 10 lb. for acetylene. Time required for cut shown, 1 hr. 10 min.

Highway Bridge Forms Carried

USING a long-span cableway and riveted steel-truss centering the Hardaway Contracting Co. is building a concrete bridge over the Broad River, near Columbia, for the South Carolina State Highway Department. The bridge has five 113-ft. arch spans over the river channel, and additional girder spans for the approaches. The overall length of the structure is 1,159 ft.

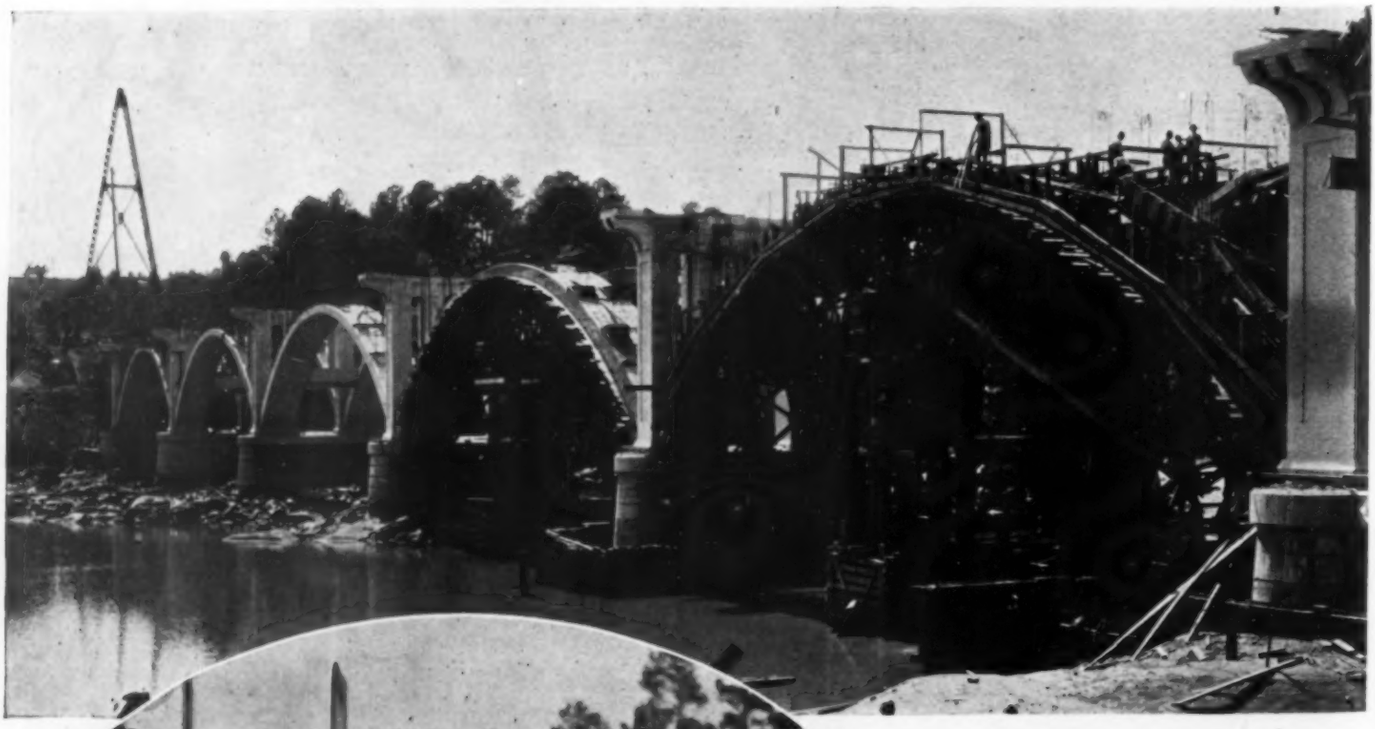
The steel towers of the cableway are spaced 1,252 ft. apart. A central mixing plant adjacent to the head tower is served by a railroad siding. The sand and stone used are unloaded to stock piles or to an overhead supply bin with a clamshell bucket on a steel derrick having a 112-ft. boom and a 115-ft. mast.

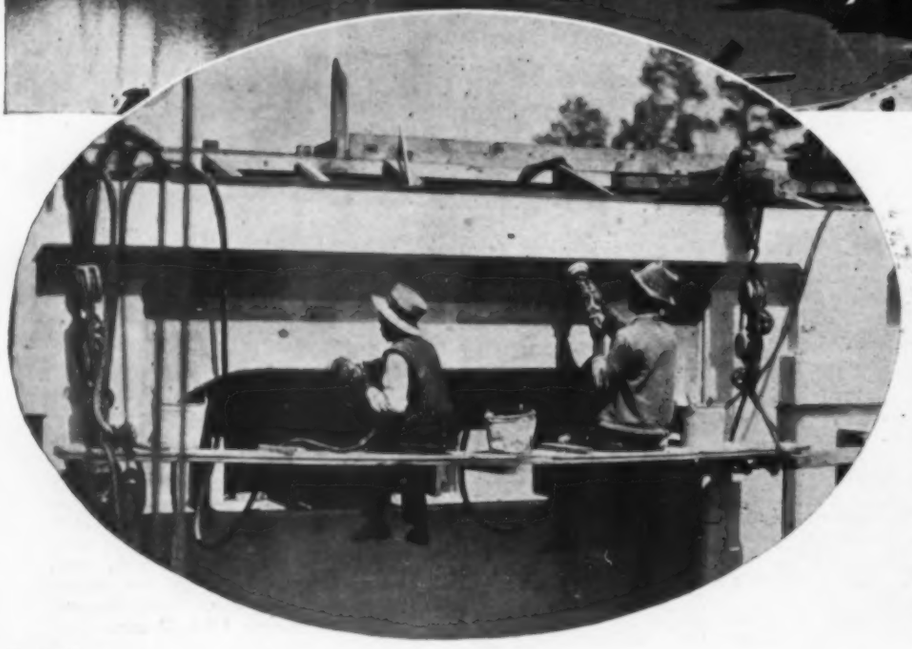
The output of the mixing plant is delivered to the bridge in controllable bottom-dump buckets handled by the cableway. The latter also moves all of the centering and forms, as well as most of the material excavated in preparing the footings on the solid rock uncovered at the site.

Each arch span has two ribs. The forms for each rib are carried by a pair of riveted steel centering trusses. Each truss is built up so that it may be handled as a unit, but the trusses of each pair, as set up, are X-braced together.

The haunch ends of the steel centering spans rest on timber bents seated on an 8½-in. offset at the top of the concrete footings of the permanent structure. At the crown of the two pairs of trusses carrying the forms for each arch rib the centering rests on the cap of a double pile bent standing on the rock bed of the stream and protected by a concrete footing in a cofferdam.

The deck of the arch rib forms is shored up on the top chord of the steel





ARCH RIB FORMS (*above*) are carried by built-up steel-truss centering, placed and removed as units by cableway. CONCRETE SURFACE FINISHING (*left*) is done with portable pneumatic tools.

centering trusses to the exact curve of the permanent arch. Since the centering trusses were designed for repeated use on arches of varying rise and span, there is no exact relation between the lines of their top chords and the curvature of the permanent arch rib.

The length of the steel centering trusses may be varied readily by replacing one or both end sections which are bolted on to facilitate change. The centering trusses used on this job have

by Steel-Truss Centering Units

STEEL TRUSS for centering is handled by the cableway.

served on three other bridges, and more than once on each of these.

Each riveted centering member weighs about 13,000 lb., well within the capacity of the 10-ton cableway by which they have been shifted. The trusses may be loaded on railroad flat cars for shipment from job to job.

The forms for the entire bridge are made up almost complete in a planing mill where mechanical work cuts the cost of the forms to a minimum. At the same time, more accurate results are possible at reasonable cost than could be obtained when fabricating forms high in the air on the structure. The cableway easily handles the largest of the built-up timber-form sections.

Special methods have been devised to meet the state's specifications for placing concrete. These require that concrete must not be dropped more than 5 ft. nor moved more than 30 ft. in chutes. On all pier work this has been accomplished by dumping concrete into portable wooden bins from controllable bottom-dump buckets handled by the cableway. The latter feed through short metal-lined wooden chutes directly into the forms on mass work, and through sheet-metal tremies on pier and arch-rib columns.

The bins are built so they may be shifted by the cableway to any point desired. When spotted, they are shored up in position on the centering and forms. The tremies are swung

DECKING for arch rib forms is laid on top chords of steel truss centering.

FORMS built up and reinforcement placed to receive concrete for arch rib.

from a light gallows frame with a rope block and tackle. The whole set-up is cheap and effective.

Pouring Arch Ribs

In pouring the arch ribs a two-way wooden chute diverts concrete into either or both ribs. With this method the placing of the ribs is easily balanced. At the same time the requirements for limited drop and movement of the concrete are met.

The specifications require accurate finishing of all exposed concrete surfaces. On this job Ingersoll-Rand equipment, including portable compressor and pneumatic tools, have replaced hand finishing. Air is piped from this compressor the length of the bridge. Leads of rubber hose from the pipe line serve the tools directly. These

give the operator complete flexibility as to position and convenience.

Colored workmen at common labor rates handle the finishing tools quite satisfactorily. The cost of finishing in this manner has been from 25 to 30 per cent of the cost of hand finishing on a bridge of similar size and design built recently by the same contractor a few miles downstream.

The extensive plant used on this bridge would hardly have been justified by a single job of this size. The Hardaway Contracting Co. has, however, long been engaged in this class of work. They consider this type of plant and layout the most economical for a concern which can use it repeatedly.

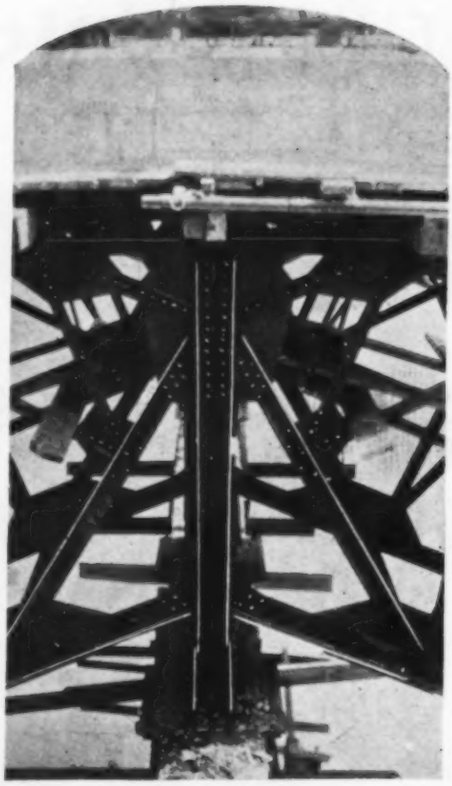
Personnel—The work is being done under the general direction of Charles H. Moorefield, state highway engineer of South Carolina. Joseph W. Barnwell, Jr., is bridge engineer of the South Carolina State Highway Department, and Cecil Johnson is resident engineer on the Broad River Bridge. T. A. Jamison, vice-president of the Hardaway Contracting Co., has direct charge of the latter. This journal is indebted to F. E. Buck, assistant resident engineer, for his assistance in collecting the pictures and data used in this article.

Stop Accidents!

Safety on the job is the responsibility of *every* construction man.

See the accident prevention pictures on pp. 40-41 of this issue.

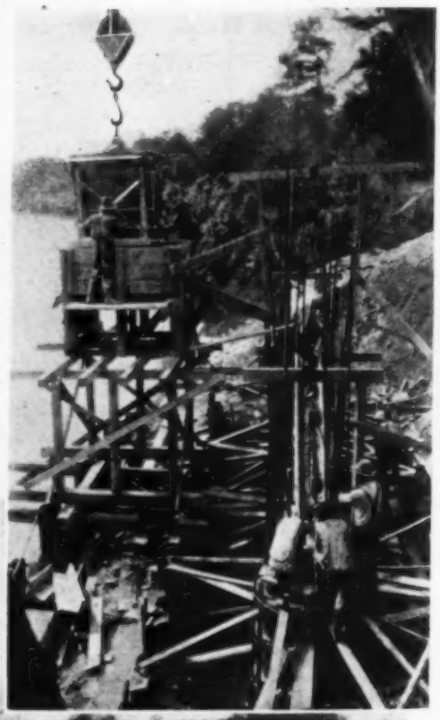
The Editor wants accident prevention pictures from YOUR job.

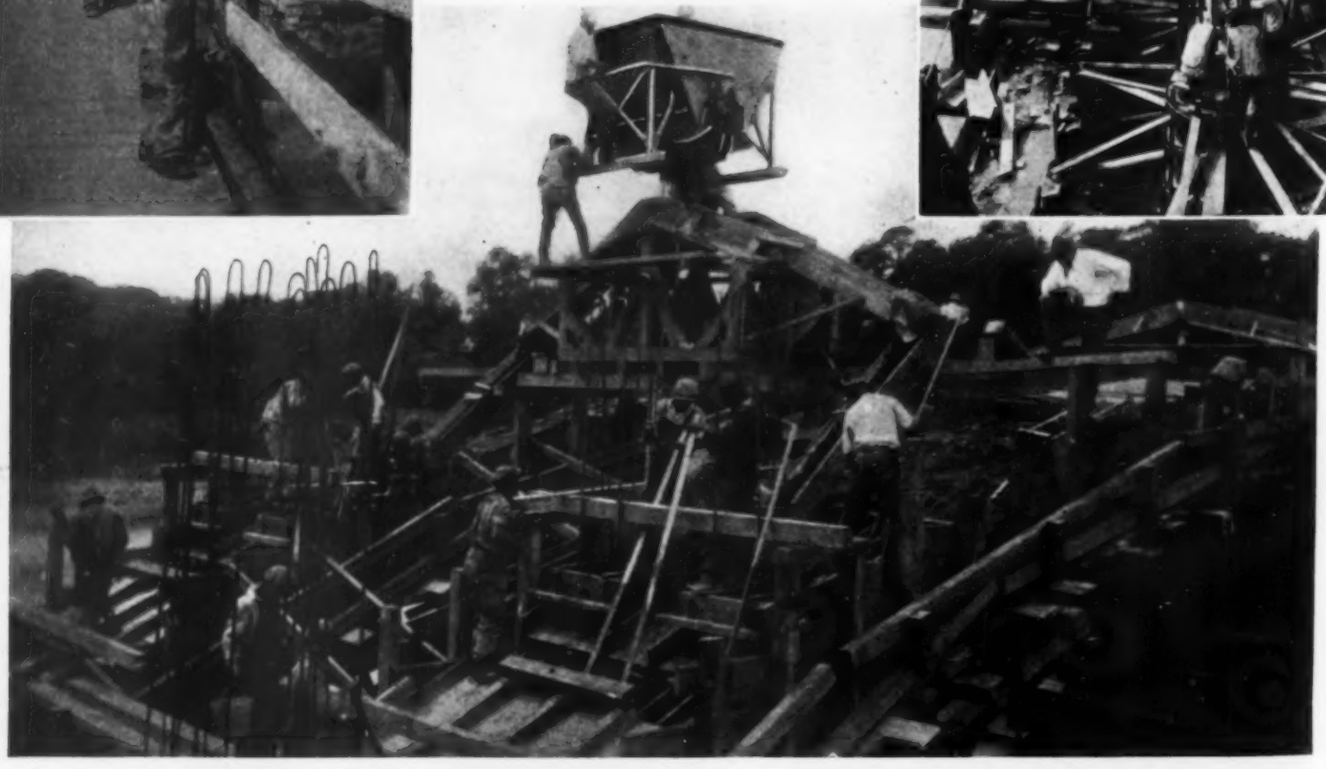


END CONNECTION of steel truss centering on cap of pile bent.

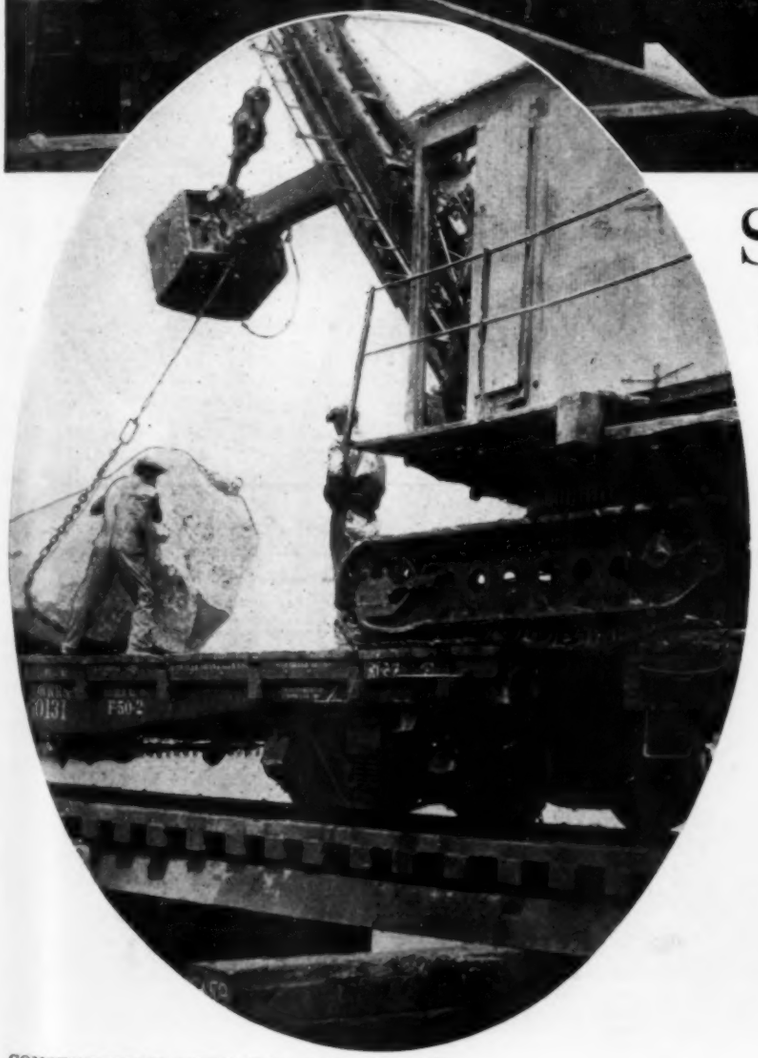
FIELD PHONE (*left*) carries instructions to cableway operator.

WOODEN HOPPERS (*right*), portable, help in distribution of concrete delivered by cableway bucket.





TWO-WAY CHUTE diverts concrete from cableway bucket into either of the two arch ribs. Concrete must not be dropped more than 5 ft. nor moved more than 30 ft. in chutes.



Shovel Rides Cars

to Unload Rock for Breakwater Construction

IN BUILDING a harbor breakwater at Long Beach, Calif., the Hauser Construction Co. used the method illustrated herewith for unloading rock from flat cars. A ¾-yd. full-swing, crawler-mounted Erie power shovel was employed. Stakes and sideboards were removed from the cars and the shovel proceeded under its own power the full length of the train.

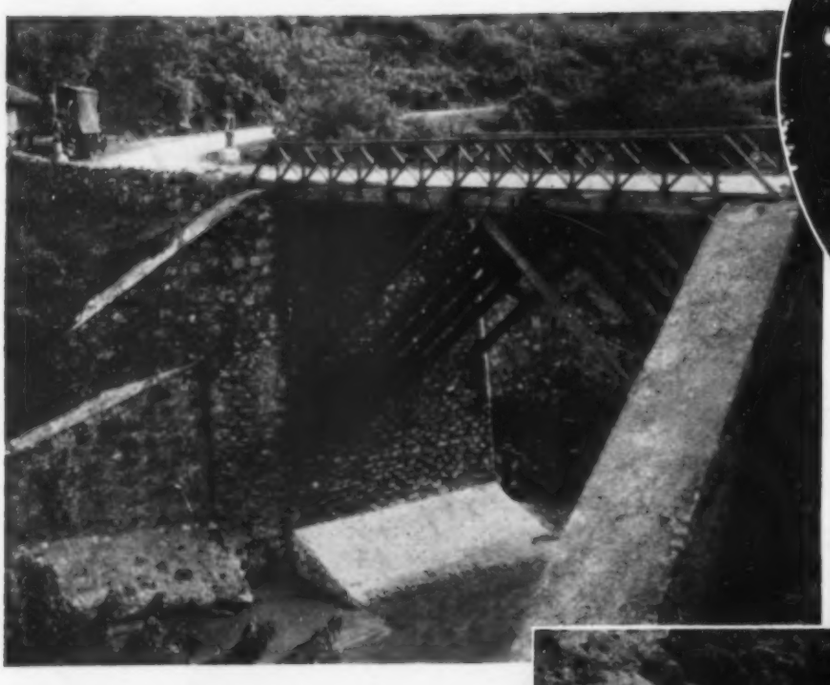
Most of the rock was shoved off the flat cars and dumped over the trestle sides to produce the fill. Some of the heavier rocks, up to 15 tons, were removed by placing a chain about them and lifting them to a place from which they could be shoved into the water. About 75,000 tons a month, for 16 months, were unloaded in this fashion.

The shovel is hooked on to each train arriving from the quarry and is left on the last flat car it empties to await the coming of the next train of rock from Riverside, Calif., 60 miles from the scene of the breakwater activities. Two such power shovels, utilized in the above mentioned manner, averaged 3,000 tons of rock each 8 hours, with a top mark of 4,200 tons in a single 8-hour day.

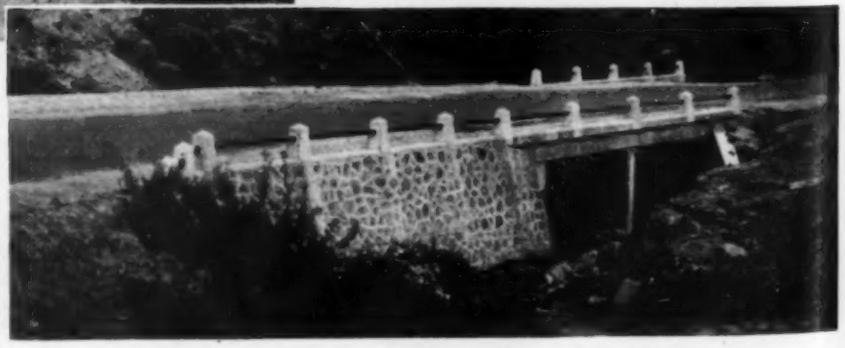
Getting Down to DETAILS

Close-up Shots of Job Methods and Equipment

FOILING MARINE BORERS. *(At left and below)* Wood piles of trestle bridge at Long Beach, Calif., are protected from damage by teredo by mechanical device consisting of ring of cedar block floats. Floating ring rises and falls with tide, dislodging marine borers from pile surface.

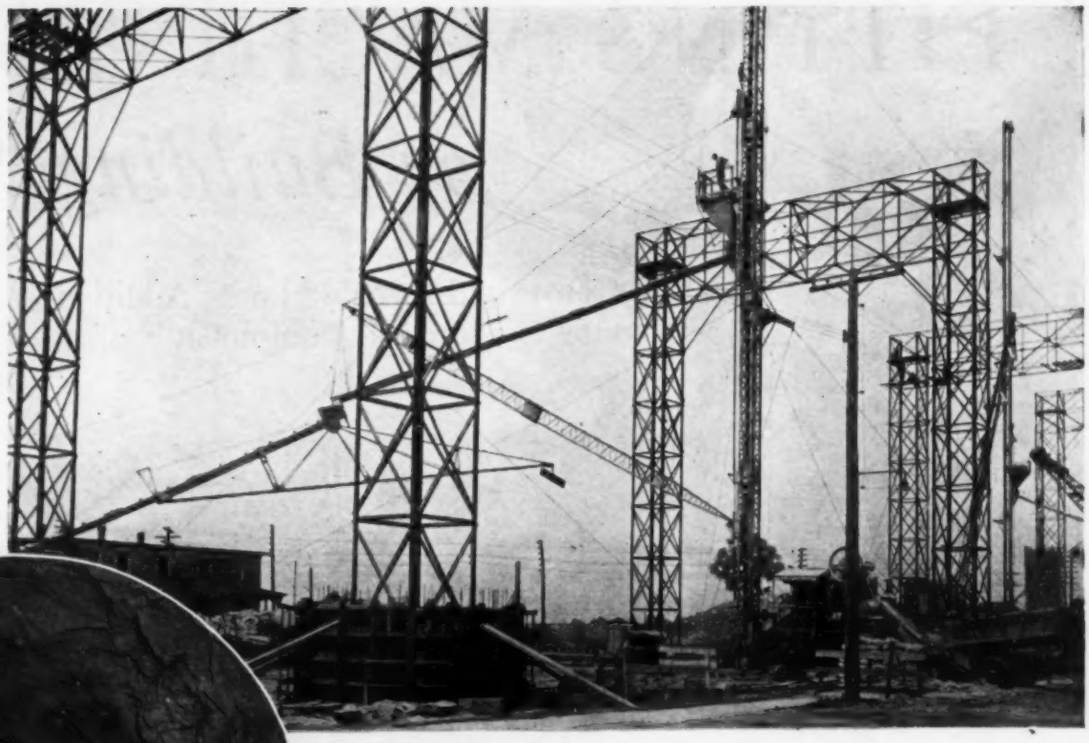


Construction Methods wants closeup shots at interesting details of YOUR work. Mail photos to Editor, Tenth Avenue at 36th Street, New York City.



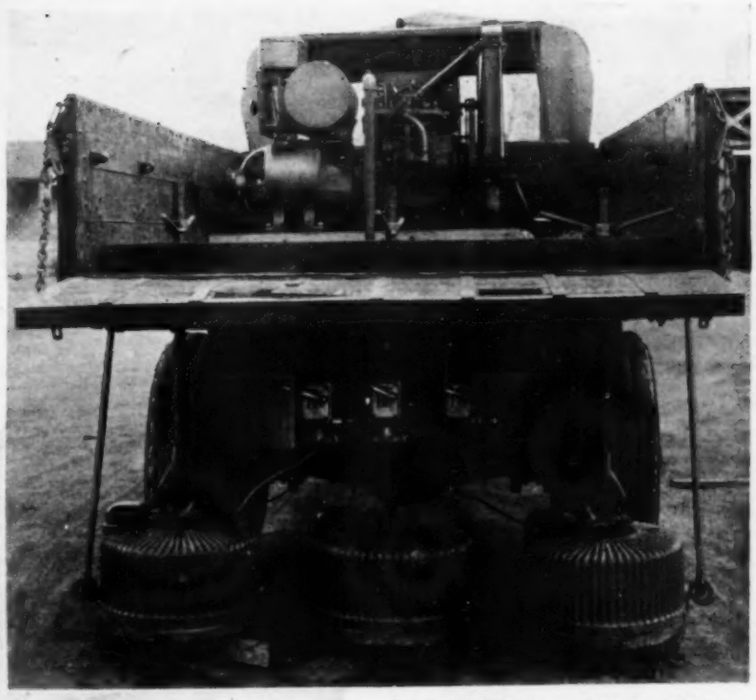
MEXICAN BRIDGE DETAILS. Truss bridge *(above)* embodies unique type of timber bracing. Double box culvert *(right)*, on skew, combines reinforced concrete and local stone masonry construction.

Photos from
P. K. SCHUYLER
Former Bridge Engineer with Mexican Federal Highway Comm.

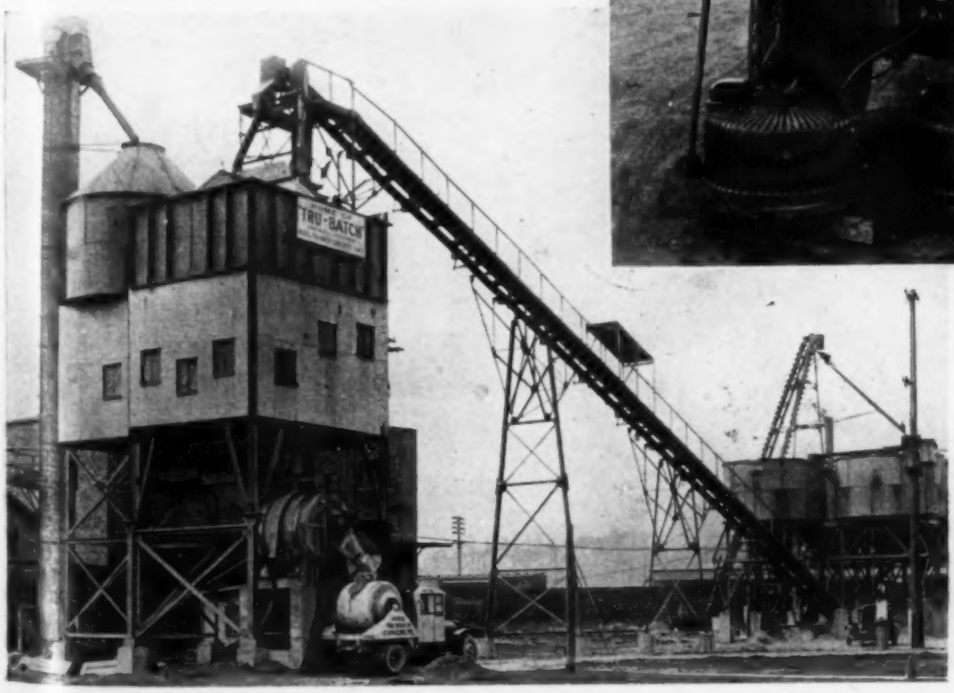


STRUCTURAL FRAMES OF STEEL, quickly assembled and placed by cranes, displace complicated system of reinforcing rods for approach piers of Kill Van Kull bridge, Staten Island, New York. Arthur McMullen Co., contractor. Lakewood mast plants, 160 ft. high, pour concrete for 21 piers reaching maximum height of 115 ft. above mean water level.

MINING SHOVEL, a Thew unit with ¾-yd. dipper and unusually low clearance, handles muck in 18-ft. diameter rock tunnel for Mideastern Contracting Corporation, on New York subway.



PROTECTION AGAINST PUNCTURES of motor vehicle tires by nails and metal fragments is afforded by this magnet sweeper operated by the Arizona Highway Department. Three magnets hang from rear end of truck 5 in. above road surface. One trip netted 618 lb. of tire-destroying material.



MODERN PLANT FOR READY-MIXED CONCRETE *(left)* showing Schacht batch truck receiving charge from mixer under aggregate bins fed by inclined belt conveyor.

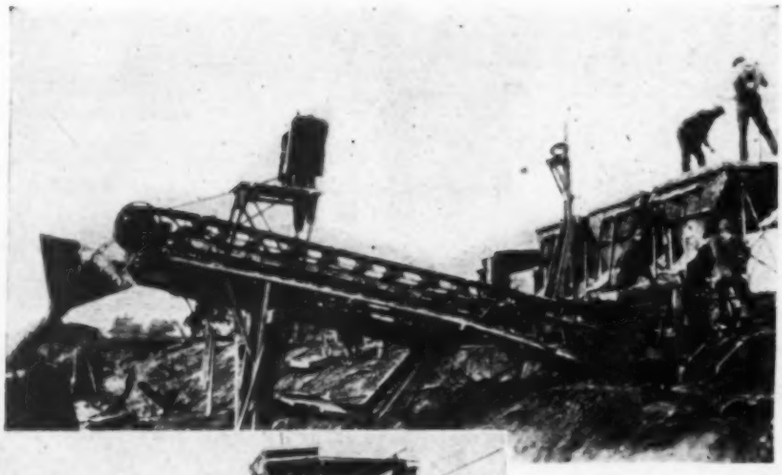
FITTING MACHINES AND *of Building Starved*

A 60-Ft. Conveyor Proved a Handy Addition to the Contractor's Equipment

By

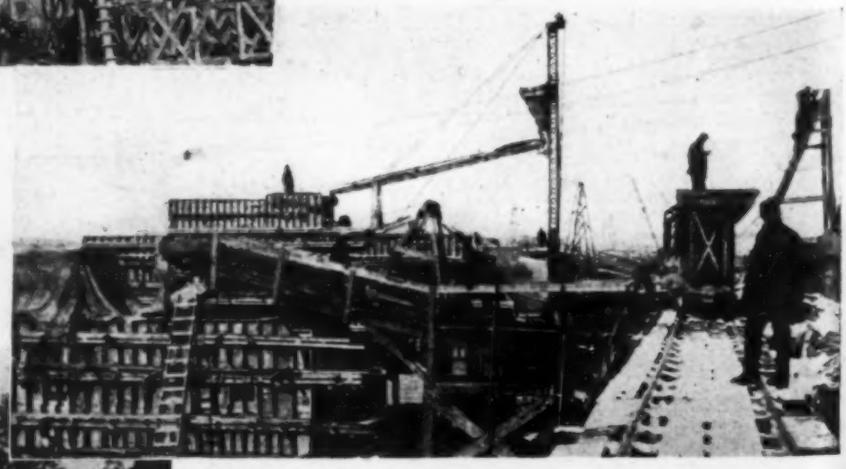
SUTTON VAN PELT

Construction Supt., Woods Bros. Const. Co., Lincoln, Neb.

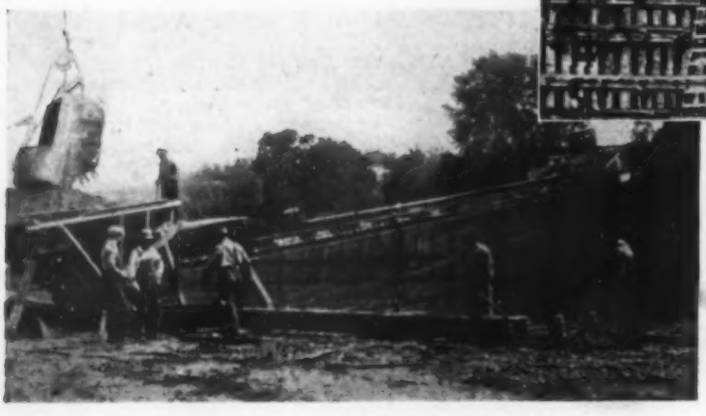


SUPPORTED AT TWO ENDS, to travel laterally *(left)*, this Barber-Greene conveyor, with belt 21 ft. long and with a 20-hp. engine over the support at the delivery end, is used by Woods Bros. Construction Co., to pour concrete in the lower approach wall from the mainland. Delivers 300 yd. of concrete in 10-hr. day when necessary.

POURING CONCRETE *(left)* in the headgate sections from the levee and cofferdam on which tracks for supply cars are located. Length, 54 ft.; supported as a cantilever; overhang at the discharge end, 10 ft. A 35-hp. engine is mounted over the high support near the delivery end to speed up the belt to about 700 lin.ft. per minute. Delivers about 250 yd. of concrete in 10 hours.



300 YD. PER DAY *(right)* is delivered by conveyor mounted on a traveler which moves on a 12-ft. gage track which pours concrete in the taintor gate piers of the main dam. Length 37 ft.; slope 1 on 4; supported as a cantilever from the lower end somewhat like a cannon mounting. Gasoline engine located over the support near the feeding hopper is 20-hp.

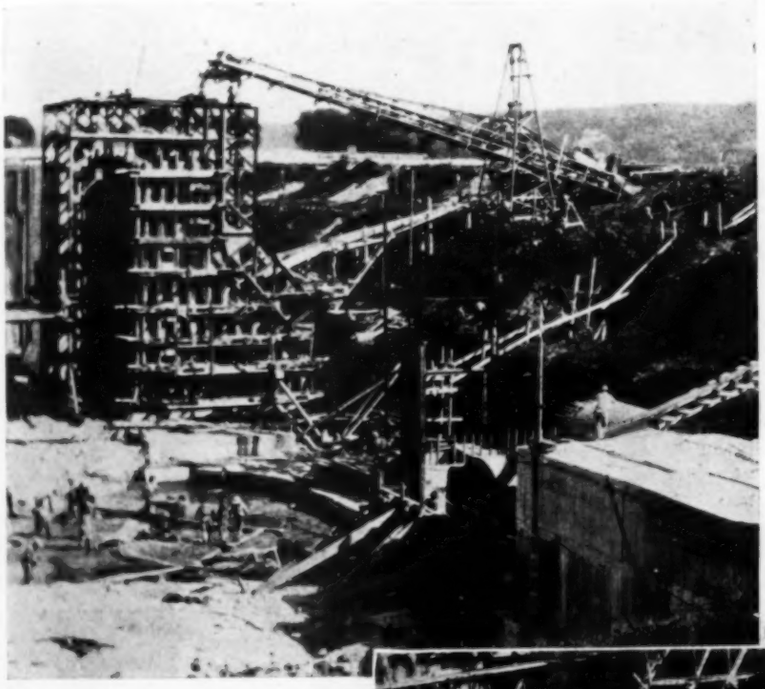


CONVEYING EARTH *(left)* a distance of 60 ft. from land across water into cofferdam. In this set-up the conveyor has a very flat slope. Earth was loaded into the hopper at the feeding end by a 1¼-yd. standard dragline outfit.

METHODS TO THE JOB

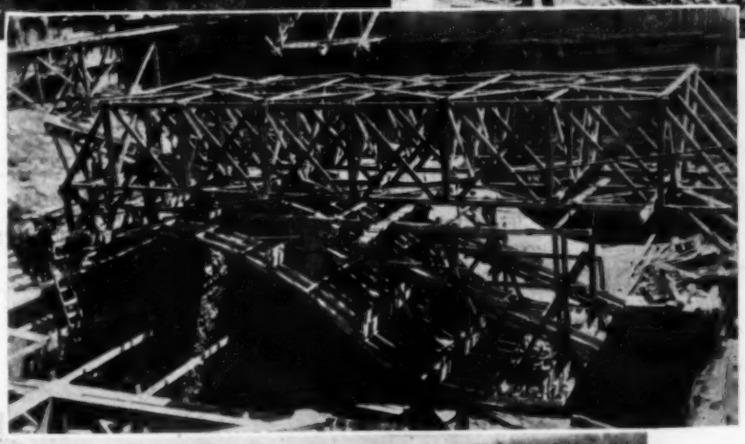
Rock Lock and Dam

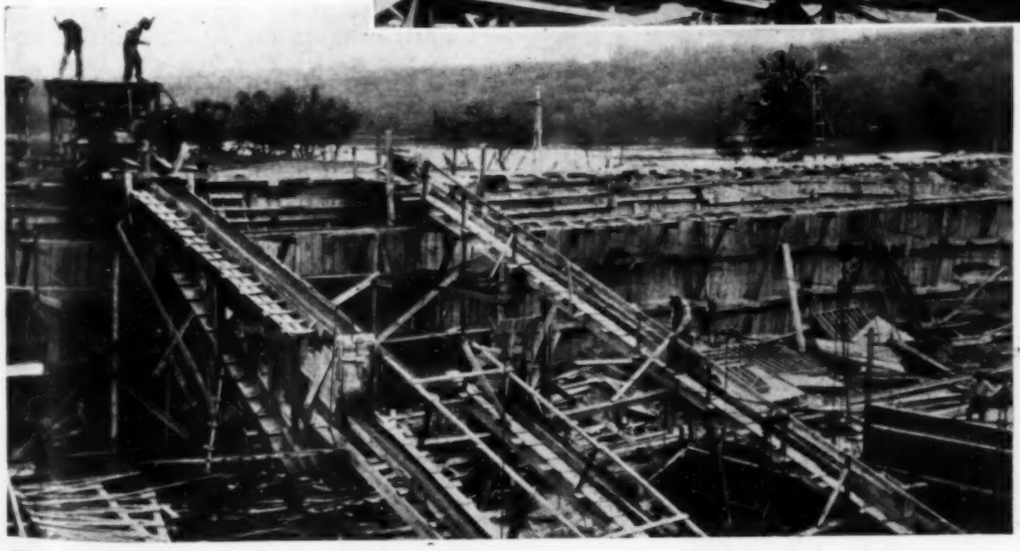
Other Useful Plant Units



POURING FOOTINGS AND LOW CONCRETE LIFTS *(above)* by gravity chutes and pouring the high forms by a traveling conveyor with 20-hp. engine suspended pendulum-like in a tower that can move laterally on a 12-ft. gage track. Length of conveyor, 79 ft.; width of belt, 30 in.; capacity, 500 yd. per 10 hours.

GIN POLE *(above)* with 20-ton hand crab, used for pulling 20-ft. steel sheet piling. Can pull 30 piles per day with six men. These piles pull best in the springtime when the frost is leaving the ground.





MOVABLE FORM *(above)* used for shaping the top of the taintor gate spillways. These blocks are 20 ft. wide and 60 ft. long and contain from 500 to 800 cu.yd. of concrete, depending upon the depth of excavation into the rock.

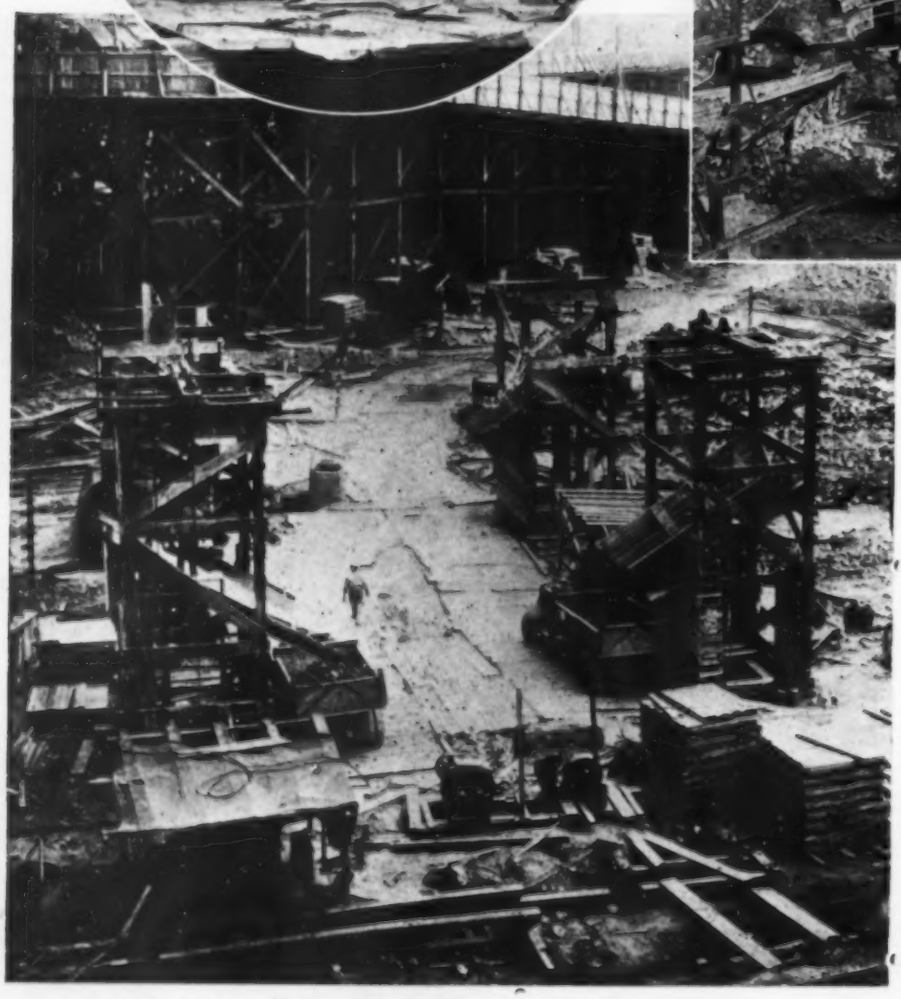
GRAVITY CHUTES *(left)* used to pour concrete in the base of the ice chute pier, ice chute and taintor gate pier 11. Area of bottom, 56x70 ft.; depth of concrete, 20 ft. Chutes supported by cables which were suspended from the top of the cofferdam on the two sides of the dam. No supports of any kind extend into the concrete except three pieces of 2-in. pipe. Size of block, 3,000 cu.yd.

DEEP WELL FOUNDATIONS

for Cleveland Union Terminal Buildings

ELECTRIC WINCH and tripod rig (*below*) hoist the muck in 4-cu.ft. buckets from the small wells and from the large wells for a depth of 100 ft. A square hole left in the platform over the top of the well allows passage of the buckets.

SIXTEEN DEEP WELLS, carried to rock, form foundation of tower. The only reinforcing in these foundations is the top 7 ft. After the 16 columns had been poured to the bottom of this reinforcing, excavation was made for the connecting struts, 2½ ft. wide and 4½ ft. deep.

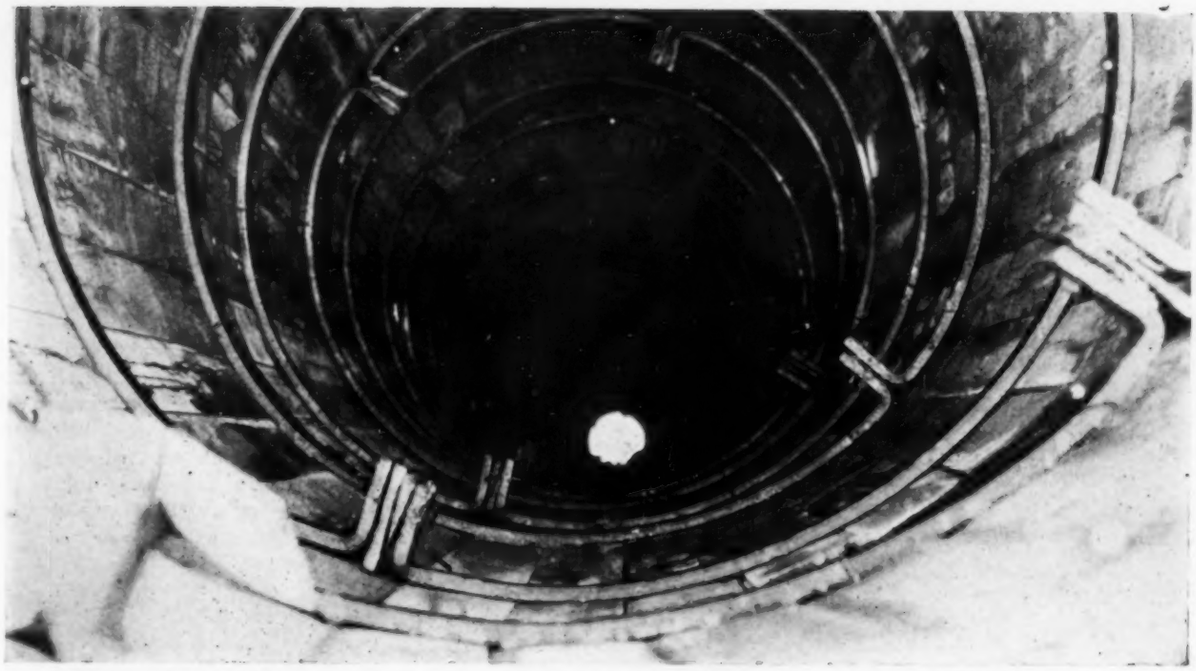


FOUR-POST HEAD FRAMES and electric hoists, with 1-yd. buckets are used to raise the excavated material from deepest shafts. Dumping platform, inclined at 45-deg. angle, is equipped with double doors opening upward and outward for passage of bucket. When load is raised above the platform, doors are shut and bucket dumped.

THE Tower Building of the Cleveland Union Passenger Terminal is fifteen stories high, with a central tower rising to a height of fifty-two stories, 700 ft. above the street level. This height is two and one-half times that of any building previously erected in Cleveland. Considerable study, therefore, was given to the type of footings to be used beneath the tower.

The general practice had been to support the larger Cleveland buildings on piles or on concrete mats. Soil tests—and the desire of the men back of the Union Terminal project to insure the stability of the tower—determined the advisability of carrying the foundations to bedrock, at a depth 243 ft. below street level and 205 ft. below subgrade for the station tracks.

Two Types of Piers—The tower footings consist of sixteen circular



WELLS ARE LAGGED with tongue-and-groove maple sheeting in 6-ft. lengths. Each set of lagging is held in place by two steel rings made up in semicircles with the ends bent in radially to form lugs. The semi circles are fastened together by bolts through holes in the lugs and are forced tight against the lagging by steel split wedges driven between the lugs.

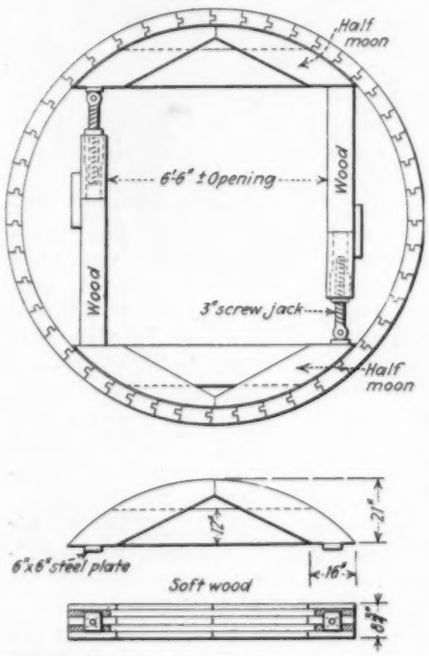
wells, varying in diameter from 8 ft. 8 in. to 10 ft. 4 in. in a space approximately 100 ft. square. Wings of the tower are carried on 73 piers, varying from 4 ft. to 7 ft. 2 in. in diameter, which rest on belled footings at an average depth of 100 ft. The bells are of various sizes depending on the weight to be sustained. Bottom diameters vary from 5 ft. 3 in. to 23 ft. 9 in. The height of the bells is from 2 ft. to 18 ft. 4 in. In some cases the bottom plan of the bell was made elliptical in order to avoid contact with adjacent footings.

Method of Sinking Wells—All holes were put down by the Chicago open-well method of construction. In using this method, the workmen dig a hole 6 ft. deep, carefully trim the side to a true circular section and place a set of lagging around the sides of the hole. The men check the dimensions by plumbing from a center point set by the engineers, the axes being marked on the top of the topmost step of lagging. They could produce this center point at any time by swinging over the hole an arm fastened to the platform at the top.

The lagging consisted of second-class tongue-and-groove maple, surfaced on both sides and cut 6 in. wide by 6 ft. long. In the large wells, a thickness of 3 in. was used and in the smaller wells the thickness was from 2 to 2½ in., depending on the size of the well.

Bracing the Lagging—Each set of lagging was braced against the sides of the hole by two steel rings. These rings were made up of two semicircles of steel bars, with the ends of each semicircle bent in radially to form lugs which butted against the corresponding lugs of the opposite semicircle. Bolts through holes in these lugs held the pieces in alignment, while wedges between the lugs forced the rings tight against the lagging. The size of the steel used for the rings in the large wells was 1x4 in. One ring for a 10 ft. 4-in. hole weighed 373 lb. For the smaller holes, ¾x3-in. steel was used.

The strength of the rings depended largely on the character of the bend for the lug. With too much radius at the bend, there was a tendency under stress for the ends to roll in, and cases were noted in which such a condition caused the ends to roll in until the junction of the two semicircles was 12 in. in from the circumference of the well. There was no salvage of either lagging or rings.



TYPICAL DETAILS of bracing drums.

In placing a set of lagging around the sides of the hole, the workmen first placed four or five pieces evenly spaced around the perimeter and then installed the lower steel ring horizontally and approximately 18 in. above the bottom of the lagging. They then set the rest of the lagging in back of the ring and placed the upper ring 18 in. below the top of the set. To force the lagging tight against the sides of the well, steel split wedges were driven between the lugs at the ends of the semicircles.

To Prevent Failures—At the least sign of failure of either rings or lagging, drum braces were installed to relieve the situation. These drums were of two built-up segments composed of four to six layers of 2-in. planking properly formed to fit the circumference of the particular hole in which the drums were used. The two segments were placed opposite each other and were braced apart by 8x8-in. timbers and screw jacks. As many as twelve drums were used in one well. Four of the wells required no drum bracing whatever.

On all the small wells and on all the large wells for a depth of 100 ft., electric winches removed the excavated material in 4-cu.ft. buckets. To re-

move the muck from wells beyond the 100-ft. depth, electric hoists operating 1-yd. buckets by means of standard four-post headframes were used.

Progress in Excavating—The average progress on the sixteen deepest wells was 4.53 ft. per shift. On the last of these wells it was necessary to complete the excavation as rapidly as possible, and a picked crew of four muckers to each of the three shifts was used on the hole, which was 9 ft. 6 in. in diameter and 210.8 ft. deep. The men completed the excavation in less than twelve working days, or in 34 shifts, an average of 6.2 ft. per shift. This record means that each mucker handled on the average 4 cu.yd. of material per shift.

GASOLINE PULL SHOVEL (*below*) excavates for service tunnel in station area.

PLACING STEEL BILLET column base (*in oval*) on concrete foundation pier.

A composite of all the tower foundation excavations gives the following types of material encountered. Beginning at elevation +50, the subgrade of the tracks, wells were sunk through 38 ft. of practically dry, blue-gray clay, 49 ft. of damp clay and 43 ft. of dry, hard clay. This last stratum, called a "grubbing" clay, was selected to carry the wing footings. The next 20 ft. was also dry, hard clay. From this elevation to El. —140 the material was dry, hard, crumbly clay, mixed with shale or pieces of rock (so-called hardpan). From El. —140 to solid bedrock, which varied in elevation from —150 to —158, a wet, hard, crumbly, blue-gray clay mixed with small pieces of shale and large and small boulders of granite and shale were found.

Safety Measures—Special precautions were taken to insure the safety of the workers. Because of the possible presence of gas in the excavation, no smoking was permitted. Electric hoists, equipped with oil switches, removed material from the shaft. Hooks at the ends of the ropes carrying the buckets were equipped with a safety catch. Signal bells at the top of the shaft were operated by means of ropes running down to the muckers. Each bell had a distinctive tone so that the hoisting engineer could not mistake a signal given at an adjacent well. The holes were lighted by strings of incandescent lights. No switches were used at the bulbs, and each bulb was protected by a heavy wire shield. Miners' safety lamps were kept hanging near the heads of the muckers to determine the presence of gas. Air for ventilation was supplied by air compressors and was carried down into the shaft through a heavy canvas hose discharging the air just above the workers.

An Ingersoll-Rand 220-cu.ft. air compressor and a National Brake 312-cu.ft. air compressor supplied the air to the shaft for ventilation and for driving the air spades. Twenty air spades, Ingersoll-Rand and Sullivan, operated on 70 to 100 lb. pressure, with a displacement of 26 to 30 cu.ft. of air per minute. Four two-drum electric hoists, using d.c. or a.c., operated the 1-yd. buckets in the deeper wells. Twenty electric winches handled the smaller buckets to a depth of 100 ft.

Choice of Concrete Mix—The use of 1:1:2 concrete in the sixteen tower column foundations and most of the wing foundations was adopted after an extensive study of the relative costs of using various mixes. If a 1:2:4 mix had been used for the sixteen foundations, their cost would have been increased 35 per cent of the 1:1:2 as built. This increase is due to the fact that the excavation for these foundations cost nearly as much as the concrete. Any excavation and concrete saved more than offset the extra cost of the richer mix.

The Spencer, White & Prentis Co., Cleveland, was the general contractor for the construction of the foundations. Frederick B. Spencer supervised the operations. Concreting was done under subcontract by the Central States Engineering & Construction Company, which poured 17,000 cu.yd. of pier concrete by means of chutes from a 240-ft. tower to funnel hoppers at the top of the wells.

In general charge of the work for the Cleveland Union Terminals Company were H. D. Jouett chief engineer, and N. H. Suloff, engineer of construction. H. L. Bigelow, as field engineer, directly supervised operations. Mr. Bigelow supplied all the information for this article.

Present and Accounted For —

A Page of Personalities

HONORED FOR FAITHFUL SERVICE. A. Guthrie & Co., Inc., contractors of St. Paul, Minn., have inaugurated a policy of naming their heavy equipment for employees with outstanding records. Standard-gage locomotive No. 216 now bears the name of Charles Reiswick, retired bridge and carpenter foreman, who joined the Guthrie organization in 1900. He was engaged on railroad and bridge construction between St. Paul and the Pacific Coast until 1917. Since then he has been on the Mesabe Range building structures required for mine stripping operations.

FRANK E. WEYMOUTH (*below*), formerly chief hydraulic engineer for the Los Angeles Department of Water and Power, has recently been appointed chief engineer for the Metropolitan Water District in charge of the construction of the Colorado River aqueduct. His former connections include the J. G. White Engineering Corporation and the U. S. Reclamation Service, of which he was chief engineer until 1924.

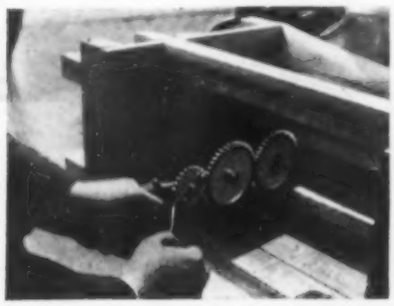
PROF. JACK J. HINMAN, JR. (*below*), is the newly elected president of the American Water-Works Association. Mr. Hinman is associate professor of sanitation at the University of Iowa and chief of the Water Laboratories Division, State Board of Health Laboratories. During the war he served in France with the American Expeditionary Forces as First Lieutenant and Captain, Sanitary Corps, with duties relating to the army water supply service.

JACOB LOUIS BAUER, newly appointed state highway engineer of New Jersey, succeeds Major W. G. Sloan, resigned to become vice-president in charge of the London office of the Foundation Co. For 31 years Mr. Bauer has served as county engineer of Union County, N. J. Under his administration the county road system has grown from 30 to 106 miles. He is now first vice-president of the New Jersey State Association of Professional Engineers and a past-president of the New Jersey Society of County Engineers.

NEW EQUIPMENT ON THE JOB

Mechanical Wire Twister

The Royson Manufacturing Co., Springfield, Mass., is the maker of the Lightning wire twister, a mechanical device used in tensioning light or heavy wires. It is furnished with either of two end spur gears: No. 8 which will



accommodate wires from 8 to 11-gage, and No. 12 for wires of 12 to 16-gage. The disks may be applied by anyone in less than two minutes.

The tool which weighs only 4½ lb., is intended for wiring steel and wooden forms and in bridging steel joists. It is applicable, also, to other purposes, such as wiring stakes on freight cars, repairing fences and twisting four wires for guy purposes.

Super-Duty Trucks

A new line of super-duty trucks designed to carry great loads at high speed has been introduced recently by Mack Trucks, Inc., New York City. These massive 4- and 6-wheel machines carry from 7½- to 10-ton loads at 30

miles per hour and climb 20 per cent grades. They will handle 35-ton loads at 25 miles an hour. They are powered by 6-cylinder high compression 150-hp. engines.

The new 6-wheel model has a rear 4-wheel drive effected by four sets of driving chains, each set of rear wheels being driven by an independent jack shaft. Brakes are on rear wheels as well.

The characteristic heavy-duty feature of Mack trucks, the chain drive, which permits greater flexibility of spring and axle movement, has been retained.

Power Take-Off Grader

The road machinery division of the Caterpillar Tractor Co., San Leandro, Calif., is now marketing a new power take-off Russell elevating grader which is said to be particularly efficient in soft or loose ground where there is

usually a considerable loss of power from bull wheel slippage.

The grader weighs 12,800 lb. The line shaft is $2\frac{7}{16}$ in. in diameter and is fitted with self-aligning roller bearings. Freedom from repair is further assured by bronze bushings for both upper and lower drum shafts. The elevator belt is 42 in. wide.

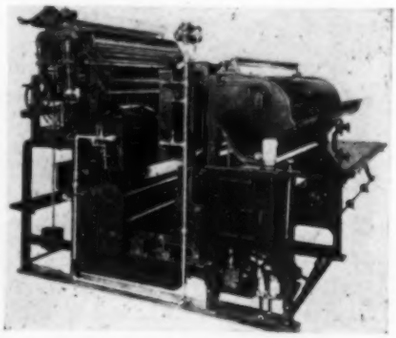
A New Tractor Combination

The Squier-Rix Co., of Cedarburg, Wis., under special arrangement with the International Harvester Co., is

equipping McCormick-Deering 15-30 tractors with Rix alligator tracks to form a unit, which, they claim, is outstanding because of its capacity for greater loads per trip and more drawbar pull. The controls are so arranged that they can be handled either from the seat or side platform.

Blue-Printing Machine

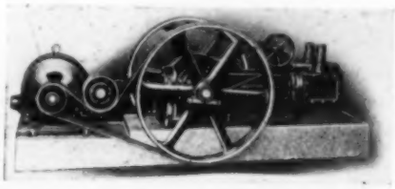
A new Peerless Model 30 blue printing machine which makes prints at the rate of 12 ft. per minute may now be obtained from the C. F. Pease Co., Chicago. It is direct gear driven throughout and is powered with a



variable speed ¼-hp. motor direct-connected to a fully inclosed gear reduction unit running in oil. It has a special four-point, auto-type gear shift providing for two forward speeds, high and low, and also neutral and reverse, the latter being an entirely new departure in blue-printing machine construction.

For Smaller Power Plants

A new line of compressors employing Timken roller bearings on the main crank shaft journals and with capacities ranging from 100 to 300 cu.ft. per minute has been announced by the Worthington Pump & Machinery Corporation, Harrison, N. J. The elimination of bearing adjustments on compressors of this type has proved advantageous to smaller power plants, many of which do not have skilled



operators. It also has removed the principal maintenance expense.

Oil rings mounted on the shaft beyond the Timken bearings deflect the surplus oil and return it to the crank case which has a completely oil-tight inclosure.

The compressor may be regulated by an automatic starter and pressure switch mounted on the motor or by a pressure regulator attached to the compressor inlet valves, holding them open to maintain constant air pressure.

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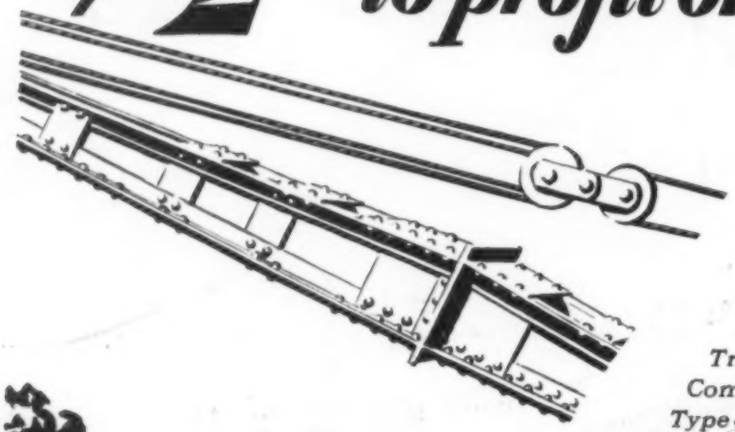
1/2 our rope *was turned to profit on this backfill..*



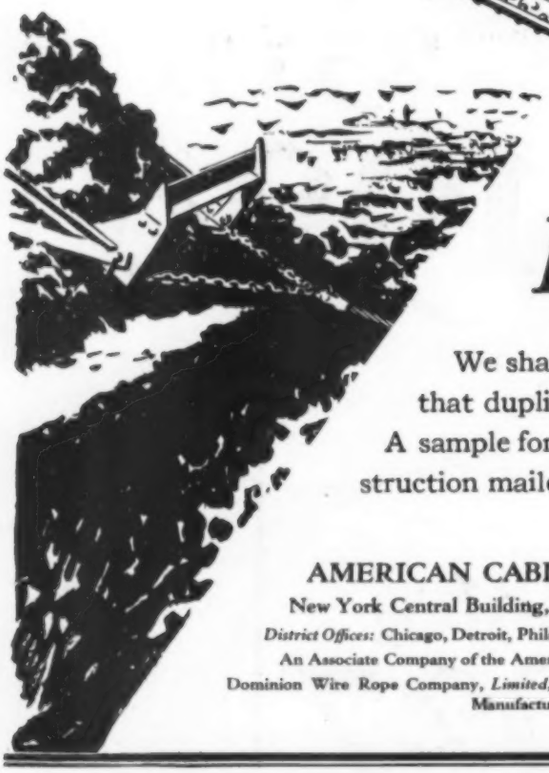
Company: A Southwestern Construction Company

Rope Service

Tru-Lay: Average Service: 8 weeks
Competitor's: Average Service: 3½ weeks
Maximum Service: 4 weeks

Rope Data

Tru-Lay: ⅝" Improved Plow Steel
Competitors: ⅝" Improved Plow Steel
Type of Machine Rope Used On: Backfiller Style BF
Remarks: Rope used as dragline. They have now standardized on Tru-Lay.



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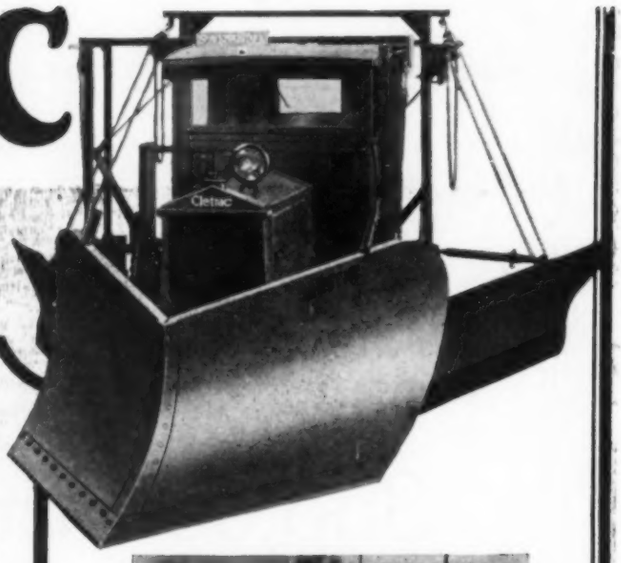

The Winter Job!

SNOW clearance will soon supplant summer's maintenance work and in this modern day of heavy, year 'round traffic the job dare not be slighted. Drifted roads and snow-heaped streets are hazards to public welfare and killers of winter business that simply must be controlled.

Throughout the snow belt you will find Cletrac Crawler Tractors foremost in the big job of snow removal, both out on the highways and on city streets. Their extraordinary power, positive traction and fast travel make them the perfect power units for this work. Practically every standard make of snow plow is designed specifically for use with Cletrac—ready for instant attachment at the first warning of "blizzard on the way."

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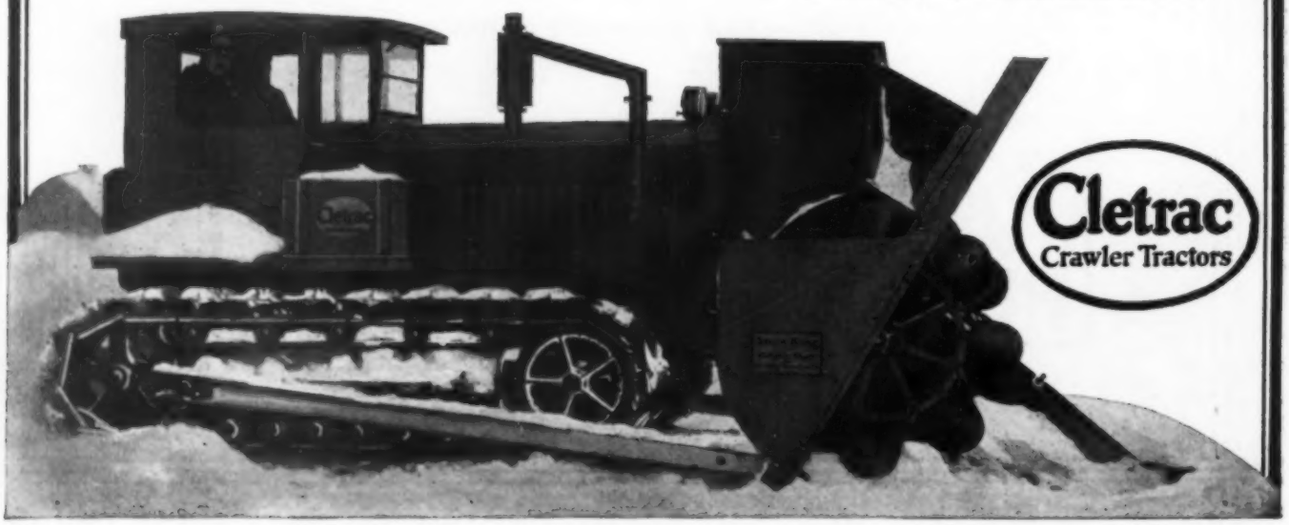

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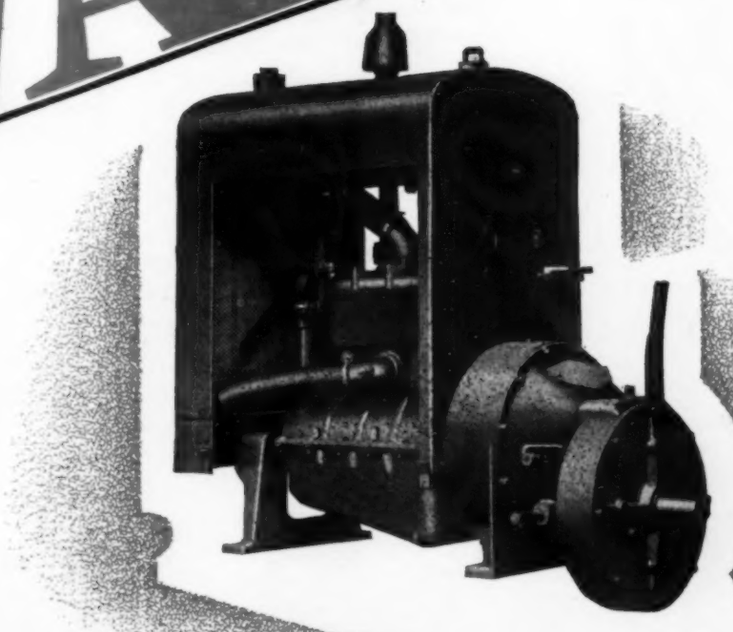
VALUE . . . your money's worth! It creeps into every sale and purchase. Particularly on construction equipment—for you get no more from a machine than that which *it has!* . . . Consequently—consider carefully the *power!* Make the Le Roi your standard of comparison. Consider design and construction—consider its field performance. Then you will learn of its dependability—its ability to stay active longer—its low cost of operation . . . Insist on the Le Roi—it is unquestionably the engine of true . . .

VALUE



1930
Road
Show
Atlantic City

LE ROI COMPANY, MILWAUKEE, WISCONSIN

LE ROI ENGINES

3 to 180 HORSE POWER

The Most Popular ARC WELDER ON THE MARKET

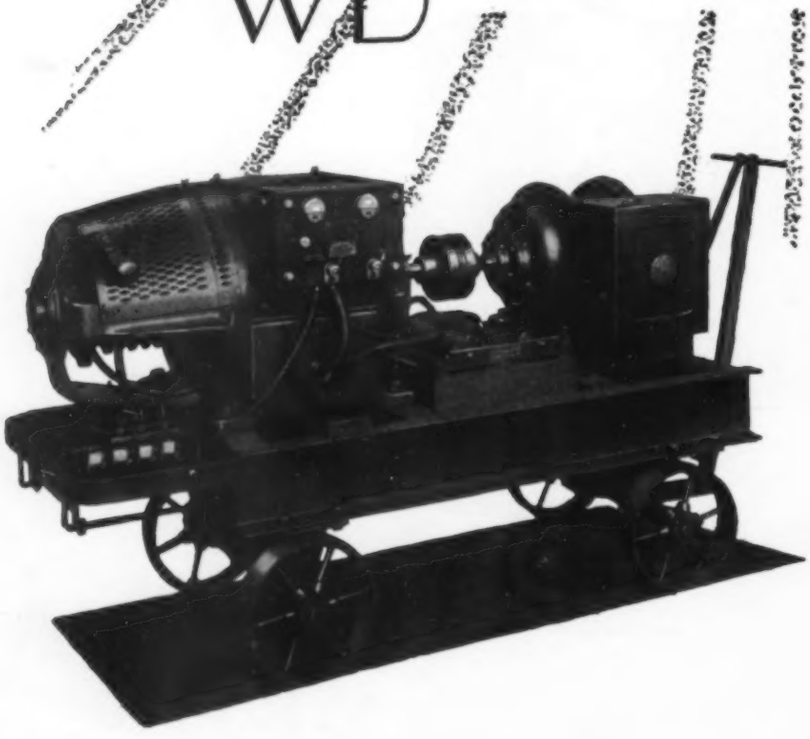
THE MORE YOU ARC WELD THE MORE YOU SAVE

It's the simplest, most substantial, and best-looking set built. Liberal use of high-grade materials, fine workmanship, and good design—inherent in all G-E products—are apparent at a glance. It is a self-excited set—that means no separate exciter to look after.

No other arc welder excels it in speed of welding or deposition of metal. Infinitely small gradations of welding current can be obtained simply by turning a handle. It is extremely easy to operate and will give 24-hour service day after day. And we back our reputation against its ability to meet N.E.M.A. and N.E.L.A. ratings—at any time.

A call to your nearest G-E office will bring you complete information.

TYPE WD



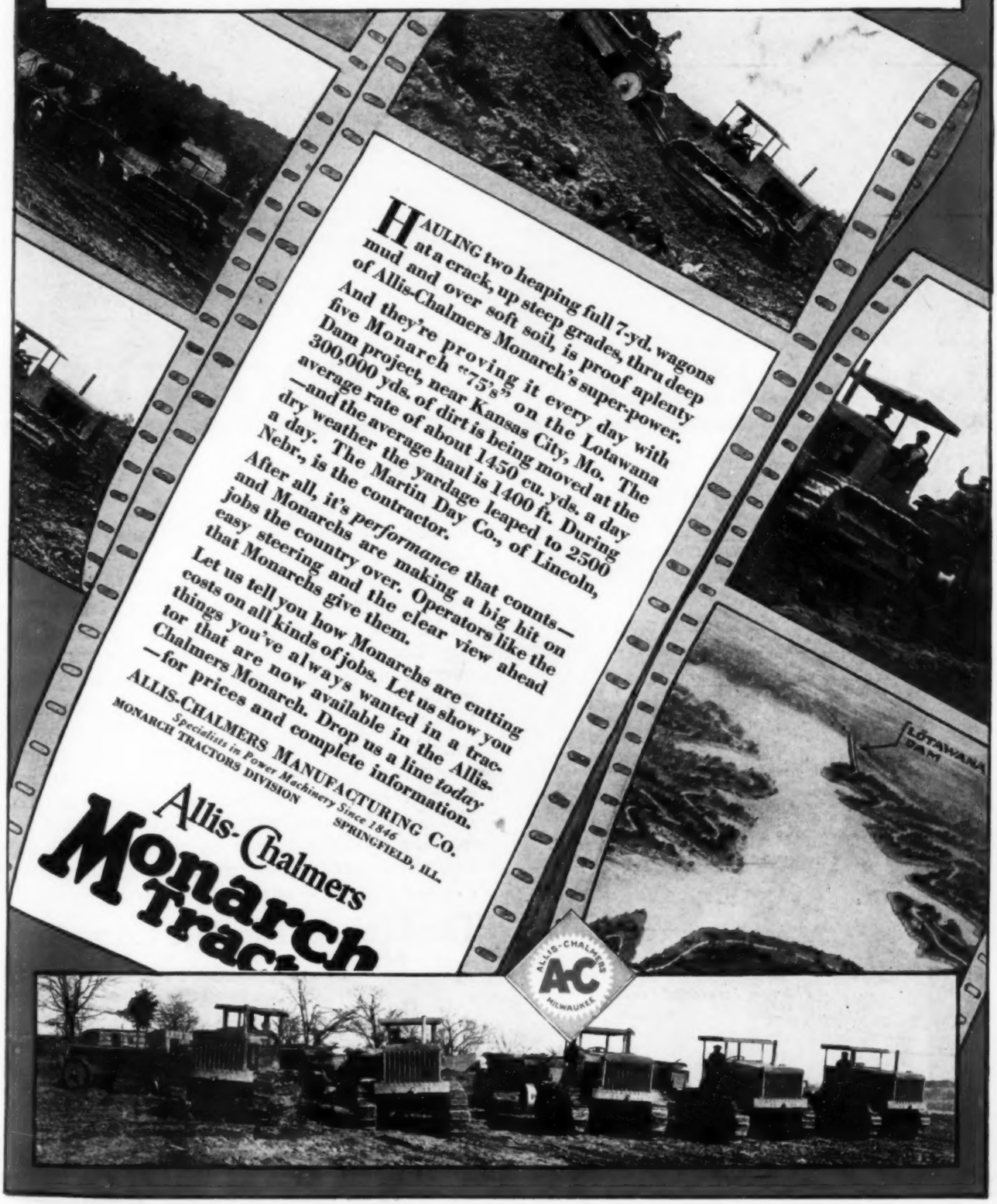
G-E welding electrodes—when used with Type WD arc welders—produce strong, smooth welds at great speed.

530-58

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

5 MONARCH Tractors Help Move Over 300,000 Yards of Dirt in Record Time!



HAULING two heaping full 7-yd. wagons at a crack, up steep grades, thru deep mud and over soft soil, is proof aplenty of Allis-Chalmers Monarch's super-power.

And they're proving it every day with five Monarch "75's" on the Lotawana Dam project, near Kansas City, Mo. The 300,000 yds. of dirt is being moved at the average rate of about 1450 cu. yds. a day —and the average haul is 1400 ft. During dry weather the yardage leaped to 2500 a day. The Martin Day Co., of Lincoln, Nebr., is the contractor.

After all, it's *performance* that counts— and Monarchs are making a big hit on jobs the country over. Operators like the easy steering and the clear view ahead that Monarchs give them.

Let us tell you how Monarchs are cutting costs on all kinds of jobs. Let us show you things you've always wanted in a tractor that are now available in the Allis-Chalmers Monarch. Drop us a line *today* —for prices and complete information.

ALLIS-CHALMERS MANUFACTURING CO.
Specialists in Power Machinery Since 1846
MONARCH TRACTORS DIVISION
SPRINGFIELD, ILL.

Allis-Chalmers
Monarch
Tract

ALLIS-CHALMERS A-C MILWAUKEE

"Here, Lad—

I have held up buying an arc welder, not because I'm against arc welding.

I've been trying to discover a machine with the *whole assemblage* of features necessary to make us some money.

From your report of six months ago, I'm convinced that the Lincoln 'Stable-Arc' welder has it."

The new improved Lincoln "Stable-Arc" Welder

"Yes, Pop—

but you mean HAD it.

Today the *improved* model also has IT. Look at the photo.

That's the way a welder *ought* to be built, with UNIFIED CENTRALIZED and SIMPLIFIED control . . . everything mounted together . . . everything under cover . . . everything right up within easy reach.

Then, too, it has the automatic starter combined as part of this centralized control, making it much more fool-proof. The unified control simplifies operation, and mounting control on top shortens the welder length. It's just like adding more floor space for nothing. So, if you're convinced that the old Lincoln welder would make us some money . . . then the new one ought to make us rich."

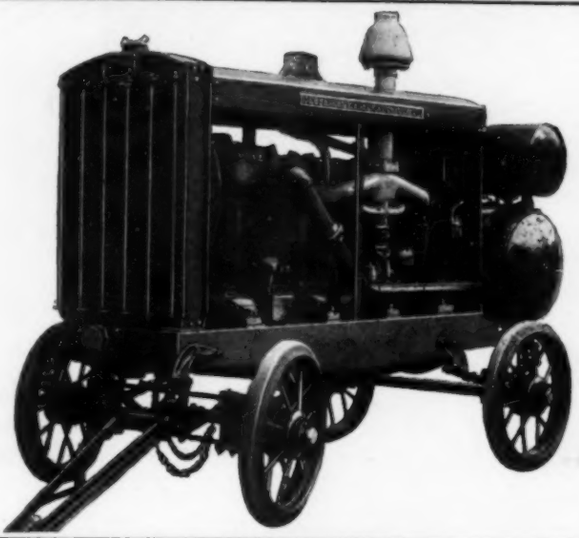
The Lincoln Electric Company
Dept. No. 32-9, Cleveland, Ohio

W-109

LINCOLN "Stable-Arc" WELDER

Thor "6" Air Compressor

The Only Compressor With a SuperCharger



The Thor Six inaugurates a NEW STANDARD of compressor efficiency and performance. On the basis of "more air for your money" it deserves an investigation on your part. Get all the facts before you buy. Compare results—check performance—consider the saving you make in buying a Thor—and then decide. Your request will bring complete information immediately.

Thor Paving Breakers and Clay Spades are the products of an engineering staff of 36 years' experience. They are rugged, powerful and efficient.

INDEPENDENT PNEUMATIC TOOL CO.

PNEUMATIC TOOLS — 246 So. Jefferson St. Chicago — ELECTRIC TOOLS

DIETZ LANTERNS

HY-LO HOT BLAST LANTERN

Popular and Handy Globe Lifts Vertically

USE RED — No other color means DANGER

VARIOUS styles of Dietz Lanterns are recommended to Contractors for night warning duty. They vary in size, structural features and lighting power but all have a seasoned reputation for dependability.

From these different types of lanterns a selection can be made that will meet every service and price requirement.

Dietz Hy-Lo, illustrated, is a large Hot Blast Lantern fitted with an UP-Lift globe frame, without lever — liked by many contractors.

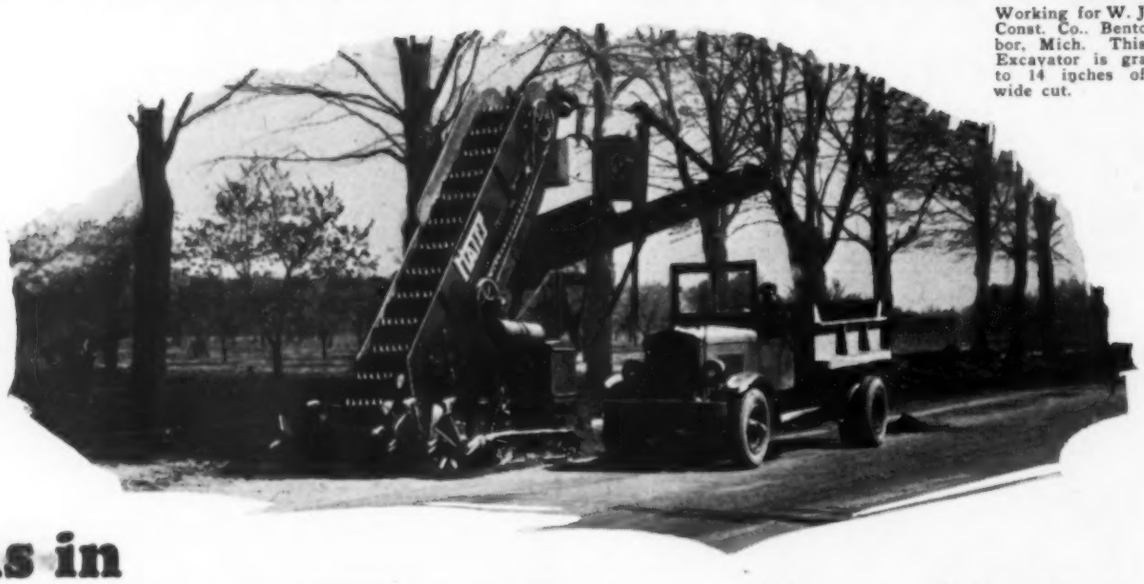
R. E. DIETZ COMPANY

NEW YORK

Largest Makers of Lanterns in the World

FOUNDED 1840

Shallow Grading



Working for W. J. Lange Const. Co., Benton Harbor, Mich. This Haiss Excavator is grading 9 to 14 inches of 8 ft. wide cut.

As in Pavement Widening

"from a skimming cut to 4 ft. depth"

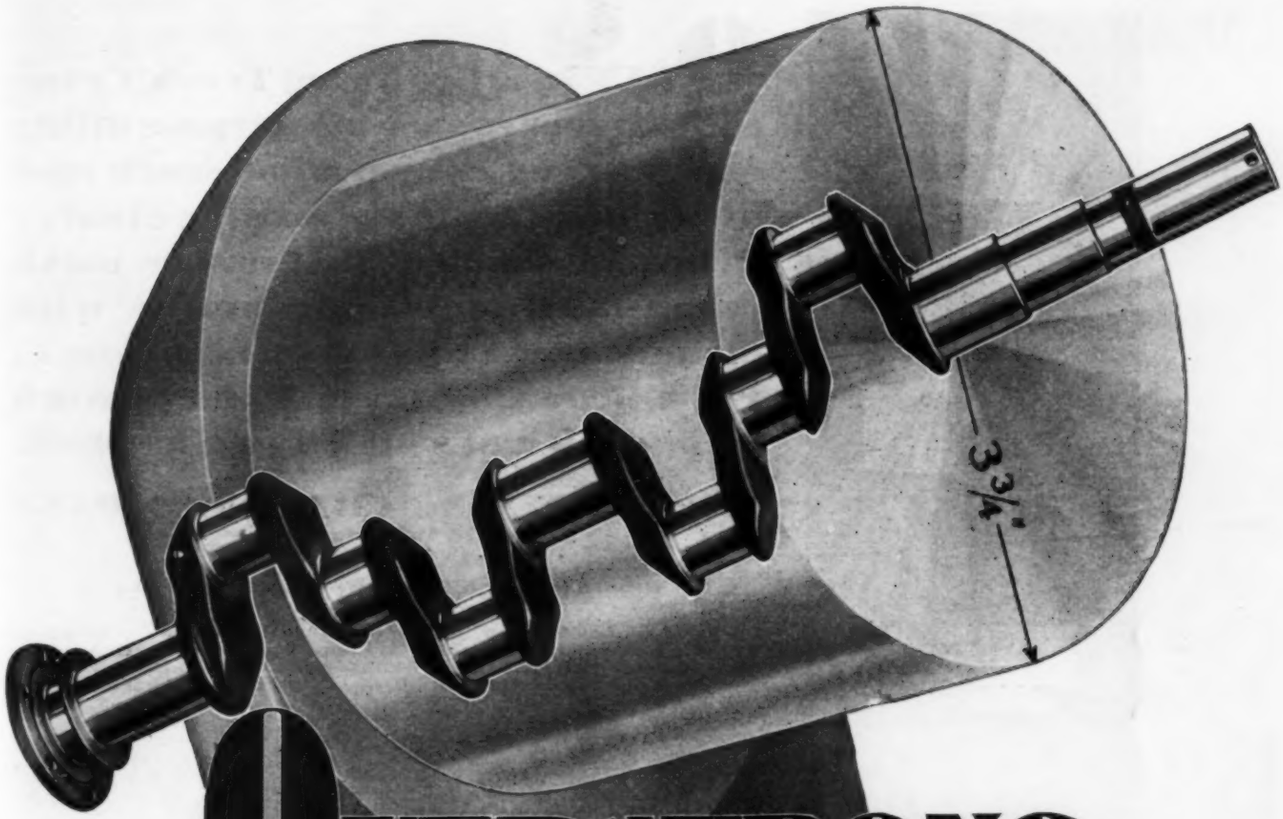
ON ANY light grading work the Haiss Excavator will make money for the man who owns it. Its 8 ft. wide cut is ideal for road widening. With conveyor discharge you can run trucks alongside and handle 200 yards a day or better when conditions are right. The Haiss Excavator is the only machine of its type. You ought to watch one work. *Let us tell you where machines are operating. Or we'll send our Performance Data Bulletin.*

"IT DIGS"

GEORGE HAISS MANUFACTURING CO., *Inc.*
139th Street and Canal Place
New York, N. Y.

Representatives in Principal Cities

HAISS EXCAVATOR



OVERSTRONG

free from harmful distortion

THE crankshaft in a Waukesha engine is extra rigid. Overstrong . . . 3¾ inches in diameter . . . it is so large that it is free from deflection. That's why its bearings are not subjected to the excessive wear that shortens the life and lowers the efficiency of engines that use smaller and lighter shafts.

The critical speed of Waukesha's crankshaft is well above its operating speed. And when this thick-cheeked, five-bearing crankshaft . . . with its big diameter journals and unusually long center bearing . . . is mounted in the Waukesha extra rigid "girder" type crankcase, unusually smooth performance and lack of critical vibration is an accomplished fact. Write for Bulletin No. 540. *Industrial Equipment Division, Waukesha Motor Company, Waukesha, Wisconsin. Offices: New York, Tulsa, Houston, San Francisco.*

969

WAUKESHA ENGINES

ONLY in a Browning Truck Crane can you secure such all-purpose utility—such speed of operation—such ease of handling plus those exclusive Browning features that assure maximum continuous production with maintenance costs at the minimum . . Put a Browning Truck Crane to work on *any* job and watch it pay for itself.

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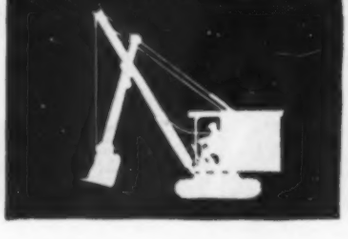
A Browning Truck Crane on building construction work in New York City.



BROWNING

LOCOMOTIVE ▲ TRUCK AND CRAWLER CRANES

The Record

AFTER having used Marion Gas-Electrics for 5 years Mr. Ottesen of John Ottesen Company, Inc., Seattle, Washington, bought his third in March 1928. This one further confirmed his faith in Gas-Electrics so that in October 1928 he bought his fourth Marion Gas-Electric. This continued confidence is both a great satisfaction to us and a solemn obligation upon us. It is to you the best testimonial in the world.

Investigate the merits of Marion equipment when next you purchase excavators. And . . .

When you think of Shovels,
think of Marion.

THE MARION STEAM SHOVEL COMPANY
MARION, OHIO, U. S. A.

See How It Stands the Gaff!

SEND today for one of these famous trouble-proof Quick-As-Wink Hose Couplings on approval. Test it out on your own work. Put it to the toughest, gruelling service that ever a coupling was subjected. Batter it, use or abuse it and you will discover that you have a coupling that outlasts the ordinary one about four times, actually adds life to the hose itself, prevents delays on the job, saves accidents and cuts costs. Quick-As-Wink Hose Couplings are the highest grade on the market, made especially to stand up under hard service and constructed to give efficient operation under any working condition.

Note These Amazing Features of the Quick-As-Wink

- Non-leaking from 1 oz. to 1,000 lbs. pressure.
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- Cannot accidentally come apart—but can be connected or disconnected quick as a wink by operator.
- Used for air, water or steam connections.
- Sizes ⅛ in. to 4 in.
- Made of Tobin Bronze.
- Prevents hose kinks and strains.
- Works perfectly in mud, snow or ice.
- Nothing about it to wear out.
- Stands hard, rough abuse.

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DUST CONTROL
With
"3-C" Calcium Chloride

The cleanest, most convenient method of suppressing dust. An application of "3-C" Calcium Chloride prolongs for weeks the same condition on the road surface as that following a good rain.

Being highly hydroscopic "3-C" Calcium Chloride absorbs as much as twice its own weight in water from the atmosphere. With two or three applications a season even heavily traveled roads are kept constantly damp and compacted.

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Write for free literature and complete information about "3-C" Calcium Chloride for Dust Prevention.

"3-C" 77%-80% Calcium Chloride is manufactured by the Columbia Chemical Division, Pittsburgh Plate Glass Company under Patents No. 1,592,971 and 1,527,121.

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BARBERTON, OHIO

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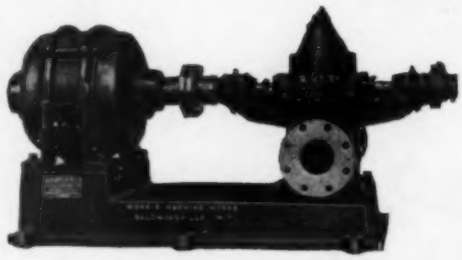
CENTRIFUGAL PUMPS



MORRIS PUMPS are made in all desirable types and sizes, motor, steam or gasoline engine, belt or chain drive, for domestic water supply, boiler feeding, circulating, irrigating, drainage, sewage disposal, hydraulic dredging, sand production and conveying, handling clean, dirty or acid water, etc.

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Sales Representatives:—Buffalo, Kansas City, Omaha, Huntington, W. Va., Houston and in other industrial centers.

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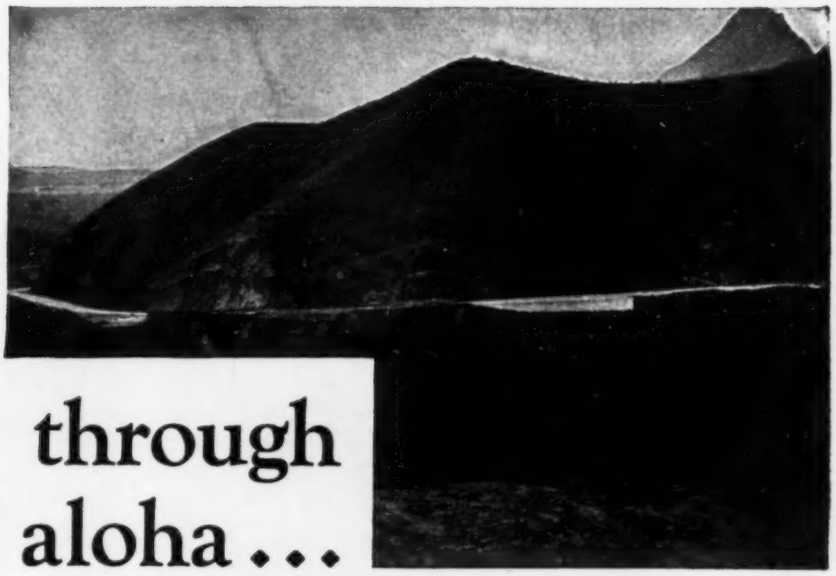
It is to the men already using Buffalo-Springfield Rollers that we direct you for a frank, unbiased opinion of their practical worth. They, of all men, can *best* explain why the Buffalo-Springfield is, and long has been, the leader among road rollers.

Various models, steam and motor driven. All practical sizes. Scarifier and other attachments when desired. Booklet upon request.

The Buffalo-Springfield Roller Co.
Springfield, Ohio

BUFFALO - SPRINGFIELD



Winding through the land of aloha...

Traffic floats over this Hawaiian road without a trace of a "hula!" It is hump-proofed and hollow-proofed—guarded against dangerous weather-stresses by Carey Elastite Expansion Joint.

SPIRALING over and around the Hawaiian mountains, near historic Hilo, is a beautiful road which tourists remember with pleasure. The Waimanalo Road, built many a furlong through solid volcanic rock. Constructed under unbelievable difficulties, but surface-smooth, every square foot.

Smooth because it is transversely crossed with Carey Elastite Expansion Joint—lastingly safeguarded against dangerous expansion and contraction. Protected against over-stresses by the pioneer "sandwich" joint, product of an organization which for more than fifty years has specialized in solving construction problems. Have us tell you more about expansion joint installation.

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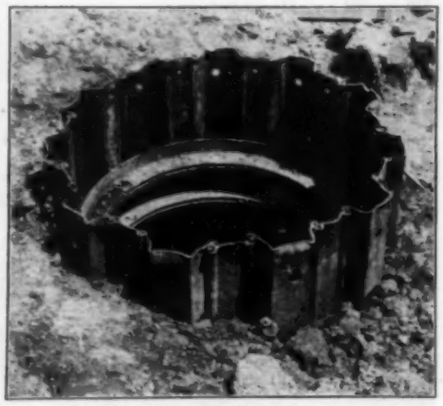
Carey Elastite EXPANSION JOINT

At Matawan, New Jersey

LACKAWANNA STEEL SHEET PILING

in Circular Piers



for support of abutment of new highway bridge over Matawan Creek

Forty-foot lengths of Lackawanna Deep-Arch Piling Section DP165 and Straight-Web Section SP8a were driven alternately to form three cylinders, each approximately 7 feet in diameter, for piers to support the abutment of the new highway bridge over Matawan Creek at Matawan, N. J.

KOLYN CONSTRUCTION CO.
Trenton, N. J.
—Contractors

As excavation inside the cylinders progressed, double steel angle ring braces were placed inside, as shown in the photograph to the left. The cylinders were filled with concrete and the steel sheet piling left in place.

There is a Lackawanna Piling Section — Deep-arch, Arch-Web or Straight-Web — for your particular purpose. Mail the coupon for Catalog 120, which describes the complete line of Lackawanna Piling Sections.

Mail in the Coupon for latest literature

Bethlehem Steel Company,
Bethlehem, Pa.

Kindly mail me Lackawanna Steel Sheet Piling Catalog 120.

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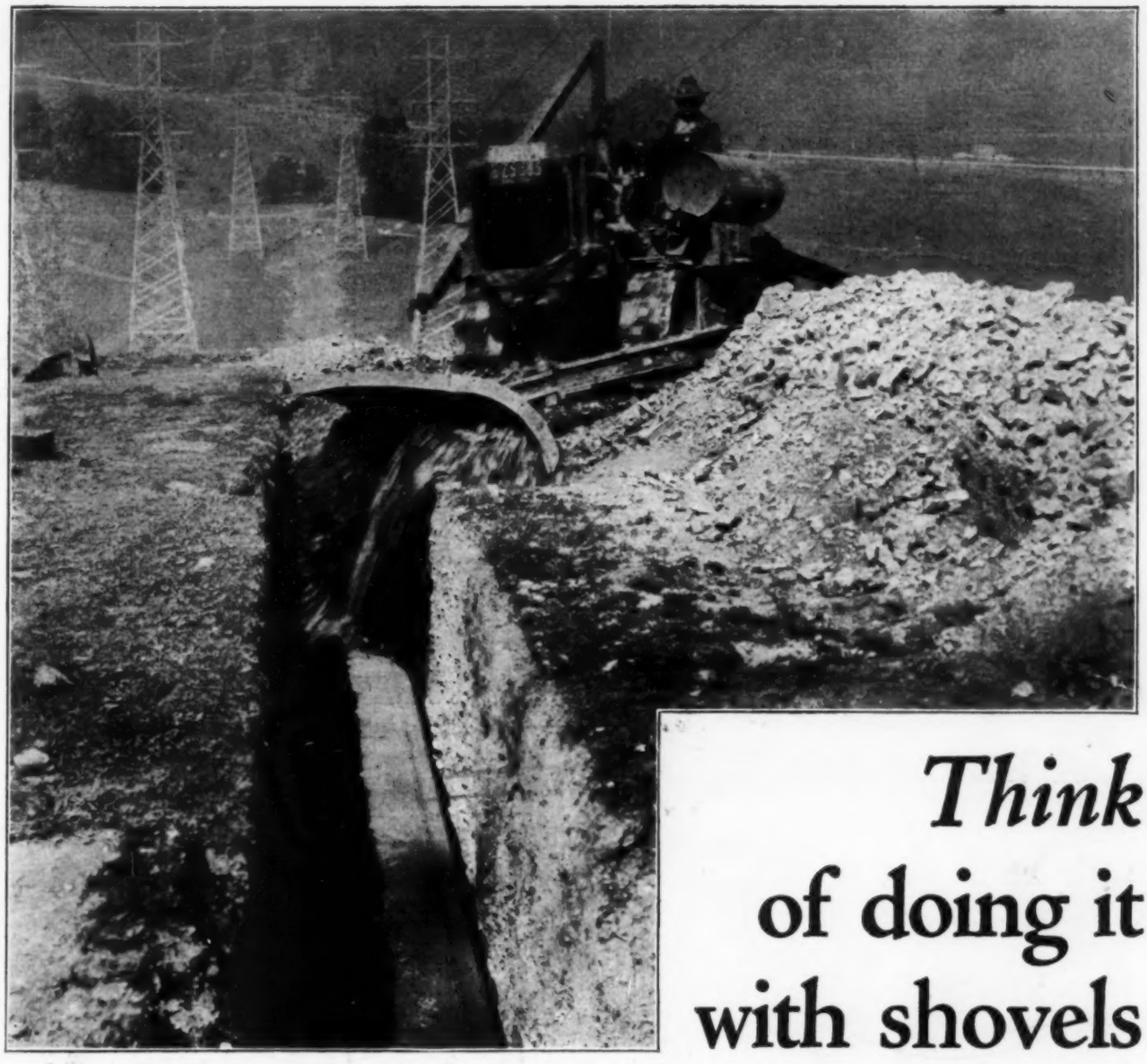
Bethlehem Steel Export Corporation, 25 Broadway, New York City.
Sole Exporters of our Commercial Products



Think of doing it with shovels

Backfilling a natural-gas pipe line—the "Caterpillar" Tractor does it in jig time! And it was the same "Caterpillar" Thirty that hauled the pipe to the job—up hills, 'cross country. In hot weather or cold, through sticky mud or sharp sand, for fighting fire or cleaning wells—the field of usefulness of the "Caterpillar" track-type tractor to the oil man seems unlimited.

Prices—f. o. b. Peoria, Illinois

TEN	$1125	TWENTY	$1975
FIFTEEN	$1500	THIRTY	$2475
	SIXTY	$4300	

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"Caterpillar" Tractors

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TRACTOR

There Are 7 Sizes

The photo below shows the Killefer 2¼-yard model revolving scraper at work in gravel screening plant.

You will find an unequalled assortment of sizes in the Killefer line of revolving scrapers, a size and capacity properly suited to your tractor's power

These scrapers have quick, simple load adjustments, bolted blades, reversible shoes and other desirable features.

Sizes from 4' to 8' in width. Capacities from 18 to 81 cubic feet, conservative dirt measure.

There are 6 years of successful performance in long hard service behind these rugged tools.

Write for folder showing all models.
Killefer Mfg. Corp.
5525 Downey Road,
Los Angeles, Calif.
Dealers in U. S. and Canada.

Killefer Revolving Scrapers

TO satisfactorily apply the so called cold, or lighter road oils requiring no heat—use

Good Roads Machinery Co.

COLD APPLICATION OIL DISTRIBUTORS

Designed and built to meet the demand for a machine as light weight as practicable, adaptable for mounting upon small capacity high-speed trucks.

ONE-MAN CONTROL FROM DRIVER'S SEAT

"Equipment that effects a real saving."

THE GOOD ROADS MACHINERY COMPANY

Incorporated

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WATERTOWN, MASS.
NEW YORK CHICAGO

HERE'S where the Koehring saves labor costs with a fast, accurate ball bearing spreader bucket that puts concrete right where it's needed.

—With a power swinging boom that saves time and makes possible fast accurate placement.

—And the Koehring oscillating boom keeps the bucket perpendicular regardless of angle of paver on subgrade—no binding or fast wear on bucket roller track or bucket bearings!

Fast! Fast because of Koehring Autocycle operation! Fast because of automatic operation of power discharge — because of high speed, clean charging and automatic water control! It's the Greater Profit earner—built as no other paver ever has been built! Know the Koehring.

SIZES

avers — 27-E six cylinder Waukesha engine, automatic operations. 13-E four cylinder Waukesha engine. Comply with A. G. C. standards.

Subgrade Planers — Built for all types of roadway, 8' to 27' widths; attachable to 27-E Paver.

Construction Mixers — 14-S, 21-S, 28-S. Trucks or skids; rubber tires optional. 28-S skids only. Weigh Mix attachments on 14-S. Comply with A. G. C. standards.

Dandie Mixers — 5-S, 7-S, 10-S. 5-S single or four cylinder, 7-S two or four cylinder, 10-S four cylinder gasoline engine. Charging skip or low charging hopper and platform. Rubber tired or steel rimmed wheels. Comply with A. G. C. standards.

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KOEHRING COMPANY MILWAUKEE, WISCONSIN

PAVERS, MIXERS — GASOLINE SHOVELS, PULL SHOVELS, CRANES AND DRAGLINES

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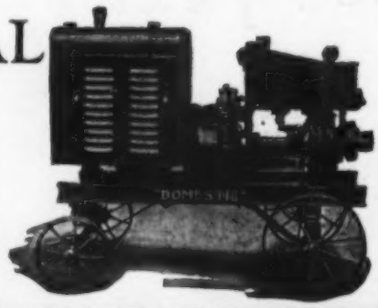
KOEHRING HEAVY DUTY

A5240-1

"DOMESTIC" AUTOMATIC PRIMING CENTRIFUGAL PUMPS



This Pump absolutely primes itself; and will draw water 27 feet vertical. Is ideal for use on all types of dewatering jobs including Drainage Point Pre-drainage, as shown in cut. The positive high vacuum this Pump is able to create has, in many cases enabled contractors to drain DRY, deep excavations where other suction type pumps have failed.

Automatic Control of vacuum producing action keeps the Pump primed whenever there is enough water to seal and fill the suction line.

This is a valuable feature, as it not only gives large pumping possibilities but KEEPS the excavation DRY by taking care of seepage in flow.

Literature upon request.

Manufactured by

"DOMESTIC" ENGINE & PUMP CO., Shippensburg, Penna.

HUMDINGER PUMPS

Non-clogging, everlasting rubber ball valves, totally enclosed, running-in-oil jacks, bronze bushed bearings, all steel trucks, and enclosed engine crank cases make HUMDINGER PUMPS.

THE CONTRACTOR'S CHOICE

Full detail description given in Bulletin No. 1034 CM. Send for a copy.

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Factory: Hackensack, N. J.

60 ton Hydraulic Pipe Bender

DO YOU BEND MUCH PIPE?

If you do you need a Watson-Stillman Hydraulic Pipe Bender

These machines are not only rapid and economical of labor, but the bends are made uniform and without danger of buckling or crushing.

We build pipe benders in a variety of types and sizes as well as a full line of Hydraulic Machinery including jacks, pumps, accumulators, presses, shears, etc.

Write for catalogs.

THE WATSON-STILLMAN CO.

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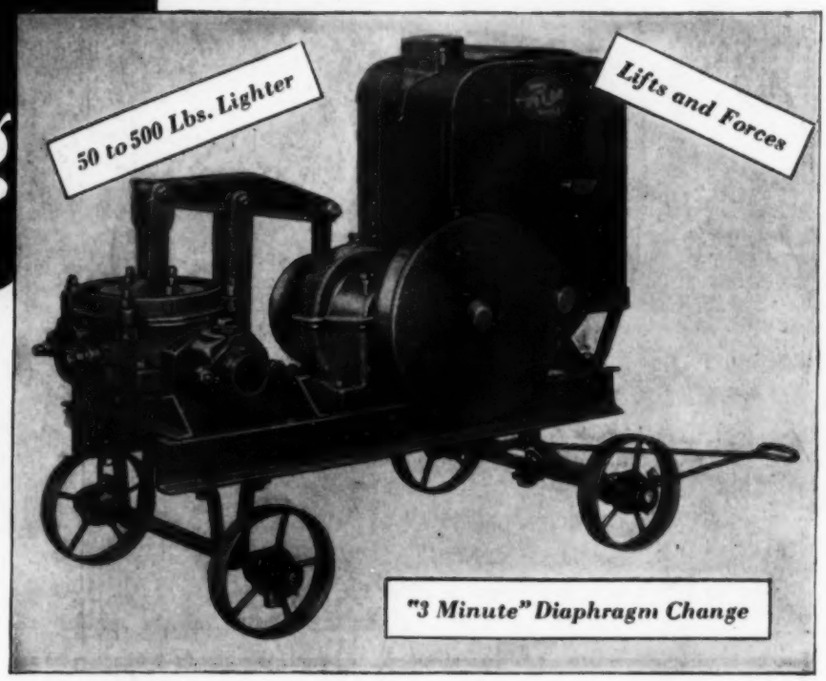
A NEW Water Moving Idea

NOVO GIVES YOU!



Solids? Yes!

Small sticks, sediment and debris pass through the valves of the new Novo Force Diaphragm Pump without hindering the smooth, efficient action.

No Sewer Gas

The closed top and tight connections prevent objectional odors from escaping at any point between the suction and discharge.

Stays Primed

A goose-neck type discharge nozzle holds enough water over the valves to keep them constantly primed—even for hours after the pump has been stopped.

"3 minute" diaphragm

Less than three minutes are required to change the Novo Tripl-Life diaphragm—which can more than outlast three ordinary diaphragms.

Rolls on Timkens

A 2 h. p. Novo Rollr Engine, with Timken Roller Bearings on crank and drive shafts, assures smooth, trouble-free operation. The engine is completely enclosed in a steel lock-up house.

Novo gives public utilities, municipalities, contractors—*a new all-'round pumping unit.*

A pump that handles a 50 foot head—that is both a suction and force pump—that's many pounds lighter than other pumps of its type—that is powered by a sweeter-running, easier started Timken-Roller Bearing engine—that can be rolled onto a truck for quicker transportation—or towed.

That's the new Novo Force Diaphragm Pump.

This coupon brings you the complete story of the new Novo 3" single or double pump mounted on four steel wheels or two wheel spring mounted trailer. It solves many pumping problems.

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214 Porter St., Lansing, Mich.
CLARENCE E. BEMENT, Vice-Pres. and Gen. Mgr.

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PUMPS — ENGINES — HOISTS

Service, parts and sales in over 70 cities

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Please send me the special folder on the new Novo Force Diaphragm Pump.

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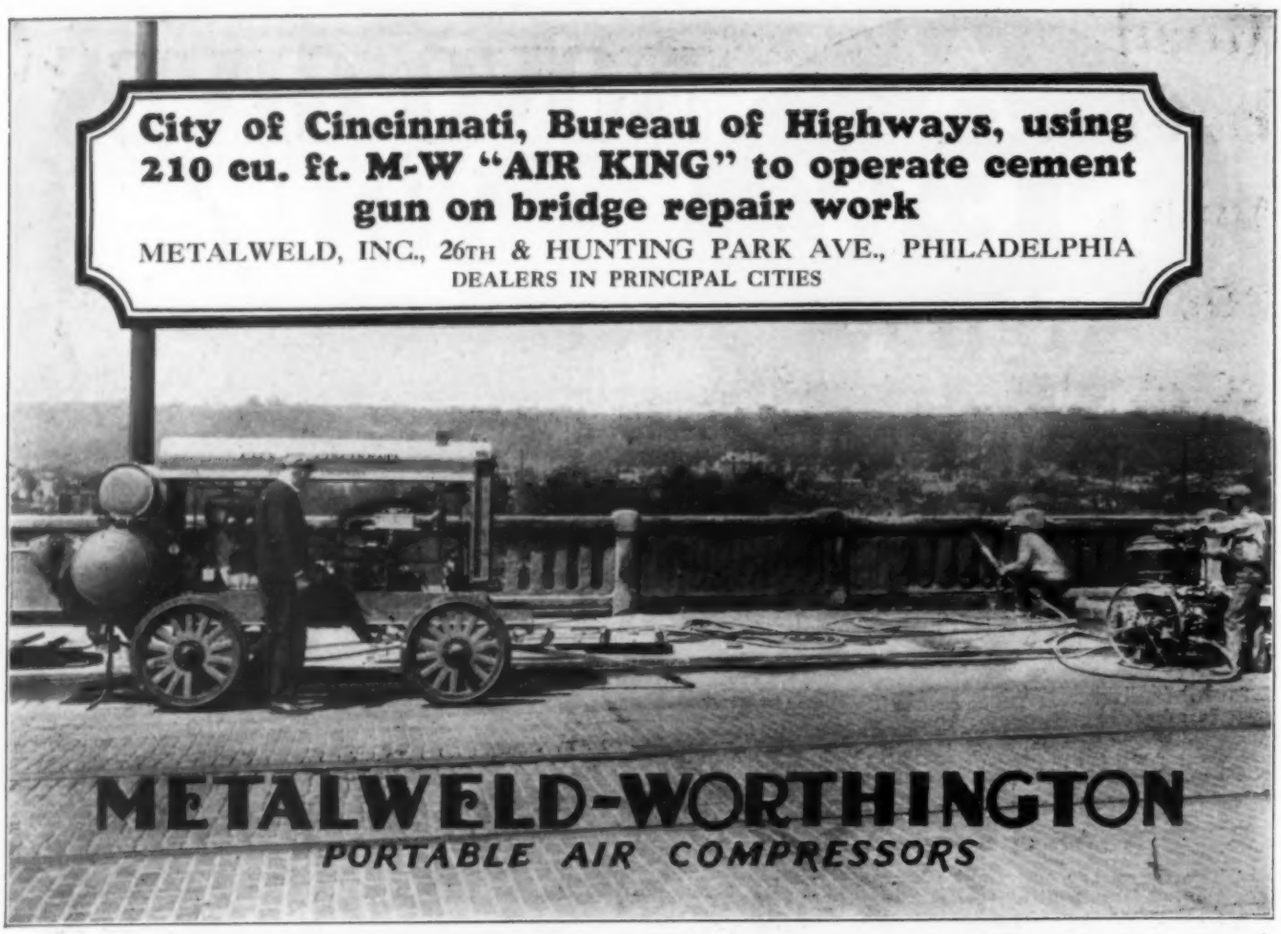
City of Cincinnati, Bureau of Highways, using 210 cu. ft. M-W "AIR KING" to operate cement gun on bridge repair work
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DEALERS IN PRINCIPAL CITIES
METALWELD-WORTHINGTON
PORTABLE AIR COMPRESSORS

Steel and Woven Tapes of all patterns. Folding Aluminum and Steel Rules.

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THE LUFKIN RULE CO.

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Spring Joint Rules with or without hook; Boxwood, Caliper, and Extension Rules.

Stand the Gaff...Can't Slip Off

Sabin Co., Gloves,
536-40 W. Federal St., Youngstown, Ohio

Send me information on Sabin Gloves.

Name .....

Address .....

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If you wish a pair of No. 206 Gloves, enclose $1.50 and check here ☐.

Where ordinary gloves scuff and tear, slip on a pair of Sabin's No. 206. They'll stand it—if there's a glove built that will. They're comfortable, too, with palm of gray buffed cowhide, with outseam, horseshoe thumb. Holdtight back prevents slipping off.

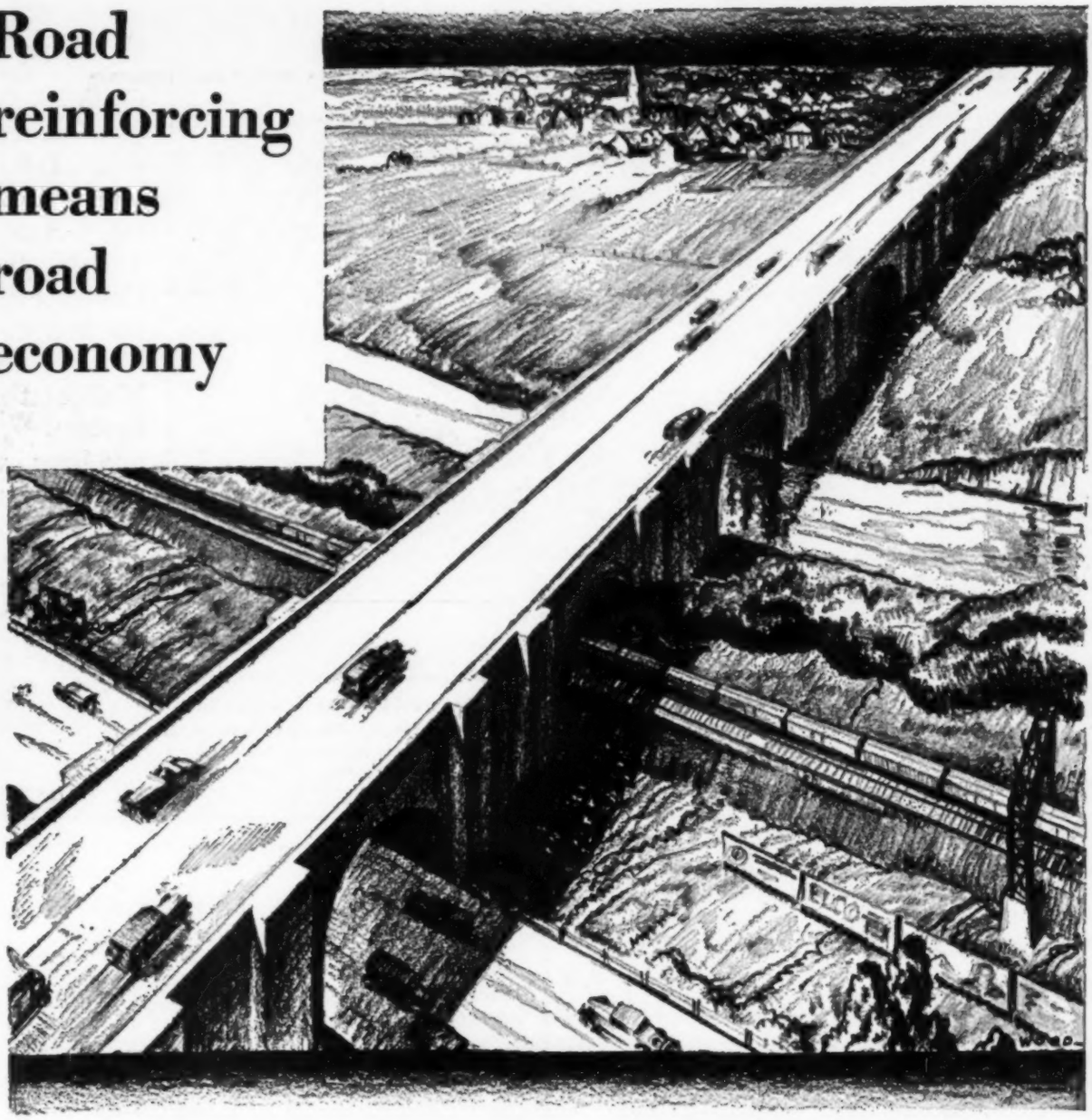
Price $1.50 per pair. Send cash, check or money order for a pair and get acquainted with Sabin's gloves.

SABIN CO.—*Gloves*

536-40 W. Federal St., Youngstown, Ohio

No. 206

Road reinforcing means road economy



One has only to scan the production records of motor vehicle manufacturers to understand why skilled highway engineers are increasingly using NATIONAL REINFORCING, not only for concrete surfaced roads but also for the concrete bases of asphalt, brick, and wood block streets.

During the first half of 1929 alone, 3,380,088 automobiles were manufactured in the United States—an increase of 45% over the first half of 1928. Yet according to authoritative estimates, the amount available for road building in 1929 will be no greater than that for 1928. Thus the increasing need for economy, strength, and durability in today's road construction is at once apparent.

The cold-drawn steel mesh of NATIONAL REINFORCING is now strengthening thousands of miles of streets and highways from coast to coast. Its steel members, spaced closely and uniformly, provide greater strength than larger members spaced farther apart. Its electrically welded intersections prevent slippage, save tying, and speed up construction.

NATIONAL REINFORCING is manufactured in a wide variety of designs to meet all highway engineering needs.

The booklets listed (*right*) on the use of fabric reinforcement in concrete road and concrete base construction will be sent free on receipt of coupon.

National Steel Fabric Company

DIVISION OF
Pittsburgh Steel Co.

4209 Union Trust Bldg. Pittsburgh, Penna.

The world's largest manufacturers of welded steel fabric

National Steel Fabric Co.,
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Send us without obligation:

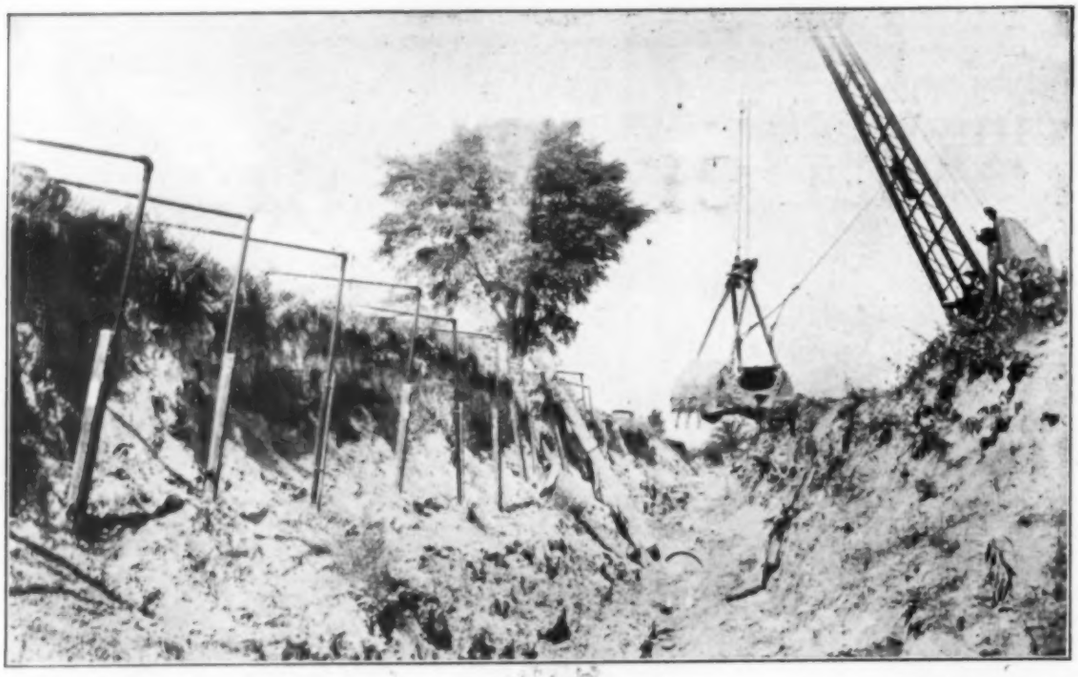
1. *Application of Results from Road Surveys.*
2. Reprint from *1929 Proceedings American Road Builders Association.*
3. Reprint, *Designing Concrete Pavement for Airports.*

Company_____

Individual_____

Title_____

City_____ State_____



Ordinary Sky Rocket points DID NOT dry up this trench. THEN—the Contractors put in a Moretrench Wellpoint System, and here is what they say:

MOORE TRENCH MACHINE CO.,
Rockaway, N. J.

Hartford, Michigan,
August 9, 1929.

Dear Sirs: We wish to thank you for coming out to see our job, and also for your recent letter.

When excavating for this ditch we dug into springs that would fairly burst up through the subgrade and boil furiously, filling the trench with water and washing in large quantities of sand.

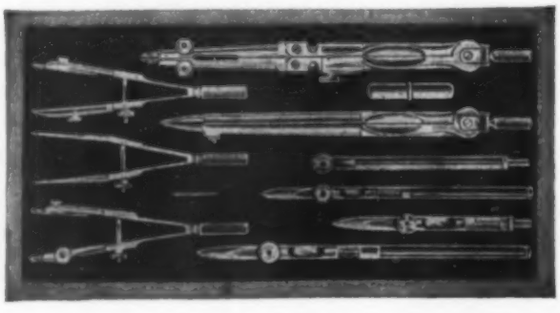
In our first attempt to dry the trench we used ordinary wellpoints, equipped with drop pipes but discarded them after three installations as being of no value on this job.

The Moretrench Wellpoints are doing the job very nicely, and since putting on the second pump, we have been in the dry and made good progress.

Yours very truly,
GETMAN BROTHERS.

MOORE TRENCH MACHINE COMPANY ROCKAWAY, NEW JERSEY

This splendid set of
SOELLNER Drawing Instruments



Set No. 1894

is made of rolled German Silver and best English Steel. It is very attractive in appearance and of superior workmanship throughout.

It Contains
3—3½" Bows
2—Ruling Pens
1—6" Compass with attachments
1—6" Divider
Complete, in velvet lined case, postage paid.

$6

KOLESCH & CO.
138 Fulton St., New York
Established 1885

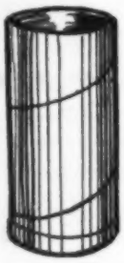
Save Your Bolt Cost

There's no need to waste time and material cutting off bolts if you use Cleveland Bolt Sleeves.

All bolts can be salvaged —forms are more easily removed — and it takes only one man to do it.

Bolt Sleeves

Other Products



Cleveland Dowel Sleeves are best for concrete road construction. Cleveland Test Containers (sizes 6 in. x 12 in. and 8 in. x 16 in.) are standard for test work. Cleveland paper tubes in sizes ¼ in. to 10¼ in. are ideal for casting holes of all sizes in form work, casting railing and conduit holes, casting culvert holes, etc. Tubes are capped or uncapped, made in diameter and lengths to your specifications.

The Cleveland Container Co.
10135 Berea Road, Cleveland, Ohio
Manufacturers of Paper Tube Products for the Construction Industry

Invader Belting

Invader Belting is as old as is Republic (28 years). Invader will work satisfactorily anywhere, except, on abnormal drives calling for super quality such as is in Champion Hi Speed.

USERS of Republic products have occasion to replace them less often than those who must replace other mechanical rubber goods. From the beginning it has been our determined intent to produce only products of exceptional durability. Let the nearest Republic Distributor tell you about Republic. Besides being a competent advisor he saves you storage space, acts as an experienced buyer and allows you the quick turnover of stock so necessary to good profits and undeteriorated rubber products. Republic distributors are well versed on any problem in rubber.

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Youngstown, Ohio

Belting - Packing - Hose
Molded Goods - Lathe Cut Goods

Powerful Enough
Dependable Enough
for The Big Job!

Standard No. 360 Schramm Compressor with a 300 ampere welder.

CALL on a Schramm to do any kind of job. It will come through and ask for more.

Schramm Inc.

Representatives in All Important Cities

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Remove Gears, Truck Wheels, Pulleys, etc., this easy way—with a CRANE PULLER!

A Crane Puller will remove ANY kind of Wheel. Here is one way of removing one kind of Wheel.

We like jobs that just "can't be done."

The Crane Puller is a tool for removing any kind of wheel, gear, sprocket, or coupling. Look for next month's ad and see something different.

Write now for circular. Use coupon.

To
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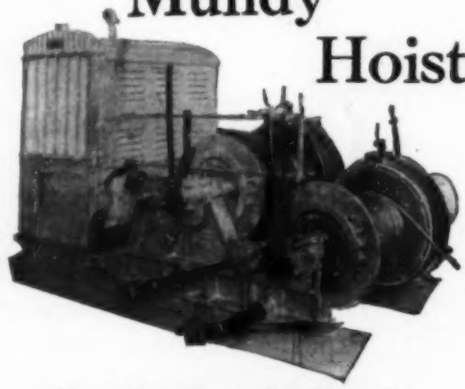
Gentlemen:
Show me how gears and wheels can be pulled easily. Quote prices on Crane Pullers. No obligation.

From .....

Address .....

CRANE PULLER COMPANY
Waltham, Mass.

Mundy Hoists



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Gasoline—Electric—Steam

Built up to a standard
Not down to a price.

Car Pullers—Cableways

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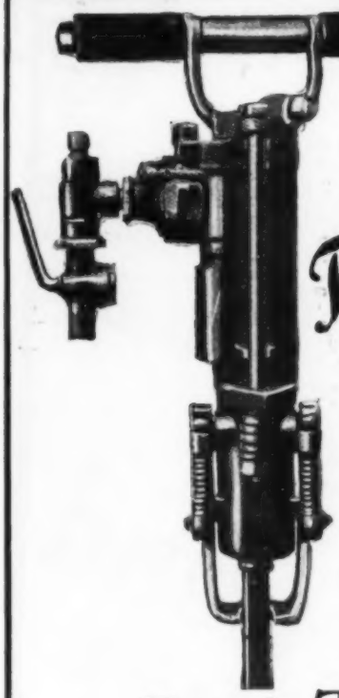


Test Figures Talk!

Tested: THREE latest model competing sinkers and the Cleveland H7.

The Test: FOUR runs, each of 2 minutes duration on the floor of a quarry. Bits used were 1½" double taper.

The Result: THE Cleveland H7 averaged 11% to 56.5% less air per foot of hole drilled than the other machines.

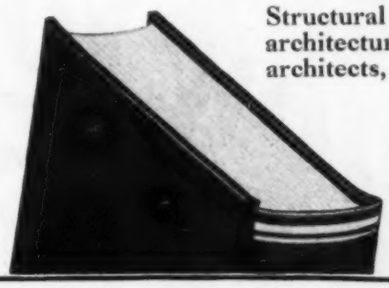
On two minute runs the H7 was 16.2% faster than one machine, 62.5% faster than the second machine, 15% faster than the third machine.

WE SUGGEST *you* put Cleveland H7's to work and know that you have the fastest, most powerful, most economical Sinker obtainable.

The Cleveland Rock Drill Company
3734 E. 78th St.,
Cleveland, Ohio

Announcing—

A New Book for:



Structural engineers, architectural engineers, architects, contractors, architectural draftsmen, and building superintendents.

Building Construction

By Whitney Clark Huntington, C.E.
Professor of Civil Engineering, University of Illinois

Flexible Binding
Price
$6.00

A Practical Guide

This text is a complete and practical treatise on the types of construction used for the various parts of buildings, the materials used in building construction, the methods used in estimating cost of buildings and in cost keeping during the process of construction. The requirements of the practical man who is on the job have been kept clearly in mind.

Particular attention has been paid to the terminology used in building construction, most of the terms in common use being defined and illustrated. The book is completely indexed so as to serve as a glossary and the text is very well illustrated.

Glance at These Chapter Headings

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Footings and Foundations.
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Steel Construction.
Reinforced-Concrete Construction.
Floor Construction and Floor Surfaces.
Roof Construction and Roofing Material.
Doors and Door Frames.
Windows.
Stairs.
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Free Examination Coupon

JOHN WILEY & SONS, INC.,
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Gentlemen: Kindly send me, on ten days' free examination, Huntington's "Building Construction." I agree to remit the price within ten days after its receipt or return it postpaid.

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C.M. 9-29

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If your equipment requires wire rope of more than ordinary stamina—rope that stands bends as well as heavy loads—that is elastic as well as tough—that will not crush easily—it will pay you to specify Yellow Strand Rope, made of genuine Sheffield-drawn steel wire of Swedish base. Get Catalog 47.

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Yellow Strand WIRE ROPE

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No Matter—

Why you move
Where you move or
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Please change my mailing address—

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Tenth Ave. at 36th St., New York City, N. Y.

I have moved FROM

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Make sure *Construction Methods* follows wherever you go.

And then, no matter where you move to all that *Construction Methods* needs is your old and new address.

If you have a new job in view, fill in the coupon and *Construction Methods* will be there to aid you with timely tips and helpful hints. Whenever you move be sure to

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The MULTIFOOTE *Power Operator*

~ it takes but a touch of the little finger for speed!

That's all—a touch of the little finger! See it! Try it! An almost imperceptible pressure starts the mighty load through the drum. That means speed!

It is entirely free from complications and action is instantaneous.

The drum can be discharged at any time after the discharge is released by the batchmeter. The skip can be raised and held for charging or let down again—all in perfect coordination with the other factors on the job—all with the speed of power. No need to fall back on manual controls.

See the 1929
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The Paver with Timken Bearings

THE FOOTE COMPANY, Inc.
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World's largest exclusive builders of road pavers.
Sales and Service Representatives in all Principal Centers

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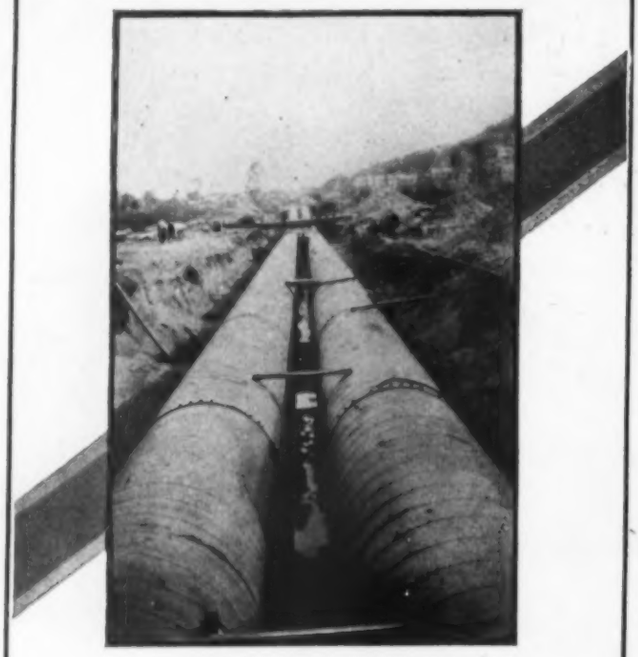

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IN addition to its smooth interior, greater carrying capacity and longitudinal joint strong as the plate itself, Lock-Bar Steel Pipe can be installed with unusual speed.

The 30-ft. standard lengths, the lighter weight in comparison with capacity, and the various types of field joints available—make this possible.

Furthermore, 25 years satisfaction from installations in important cities all over the continent PROVES that the Lock-Bar Joint will not fail. You don't have to wait and see. You know NOW that Lock-Bar is dependable. *Think this over.*

Photo shows the twin 74-inch Lock-Bar Steel Pipe line laid for the Wanaque Aqueduct in North Jersey—the largest steel pipe contract ever awarded in the East.

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LOCK-BAR
Before Closing
STRONG AS THE PLATE ITSELF

FLORY

THE "FLOR-OX" 35 HAS these many new features that make it the ideal hoist for general construction work—roller bearing thrusts for friction clutches, less weight and space with greater efficiency, positive release device on friction levers, Alemite lubrication, rope pull of 5,000 pounds at 165 feet per minute, extra heavy shafts and bearings, silent chain drive enclosed in dustproof casing and machine cut teeth on all main gears and pinions. Electric or gasoline drive. Write for bulletin.

S. FLORY MFG. CO.
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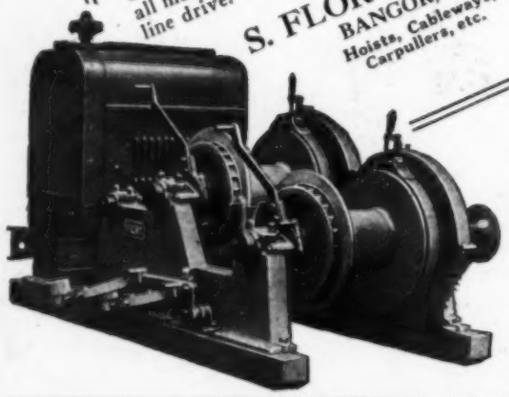
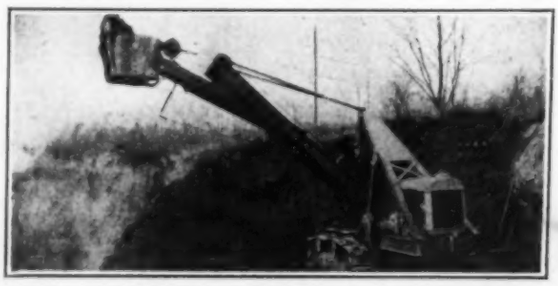
Hoists, Cableways, Carpullers, etc.





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THE speed, versatility, rugged construction, big yardage and low cost of the Fundom combination shovel, ditcher and crane, make it a sensational performer and money saver.

It makes small jobs profitable. Fast, full ¾ circle swing, 1/3 yard dipper capacity, 16½ foot radius, gasoline power.

With Trench Hoe attachment for ditching or Boom Extension for clamshell, dragline or crane, the Fundom is an unbeatable three-in-one digging machine.

Get the details and name of nearest dealer. Address—

The Fundom Hoist & Shovel Co.
314 Central Building, Lima, Ohio

The Standard for Service

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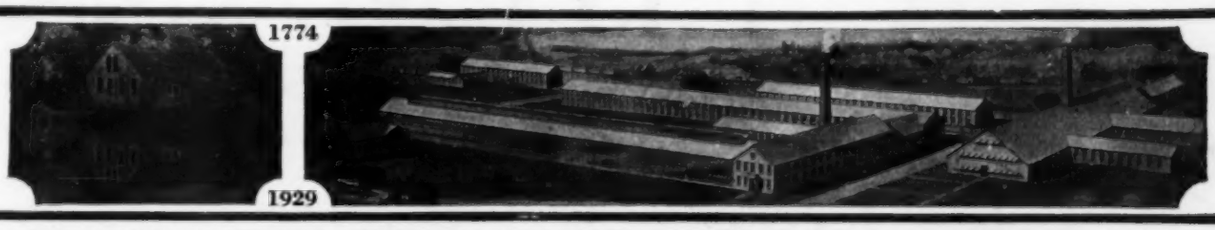
AMES SHOVELS

are USED than any other kind

The complete "All Star" Ames Line covers every shovel need
It will pay you to "Look for the Stars" on every shovel you buy



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NORTH EASTON ◂▸ MASSACHUSETTS
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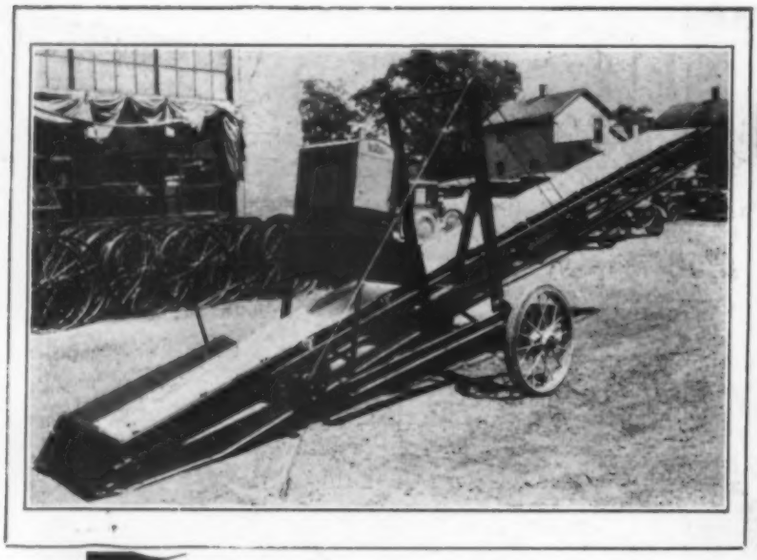

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BULLETIN NO. 105-CM

THE FAIRFIELD WAY

Fairfield Standard Portable Belt Conveyors are especially designed for handling aggregates to trucks, bins or any desired place on the job. Made in special lengths for special purposes such as handling wet concrete direct from mixer to forms. Write for complete information and prices and a copy of Bulletin 66-C.

THE FAIRFIELD ENGINEERING CO.
MARION - OHIO

HUBER 4 CYLINDER MOTOR ROLLERS

POWERFUL AND DEPENDABLE AS STEAM
EASY TO HANDLE
SINGLE LEVER CONTROL

MADE IN FOUR SIZES

5 - 7 - 10 - 12 tons

SEND FOR
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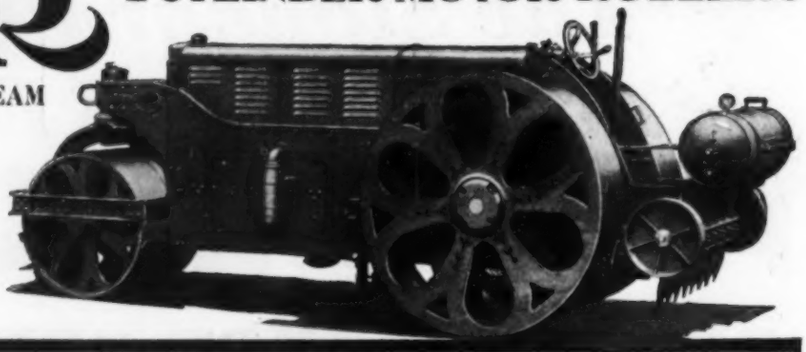

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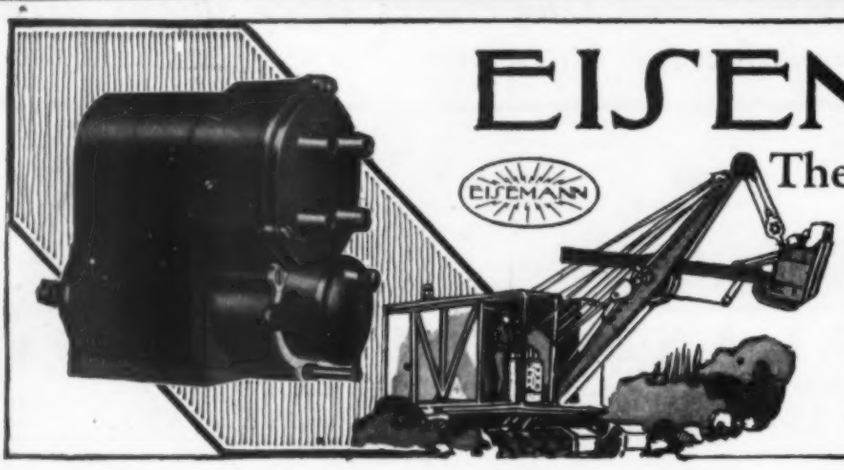

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The overwhelming choice of the builders of high quality equipment. Favored by contractors everywhere.

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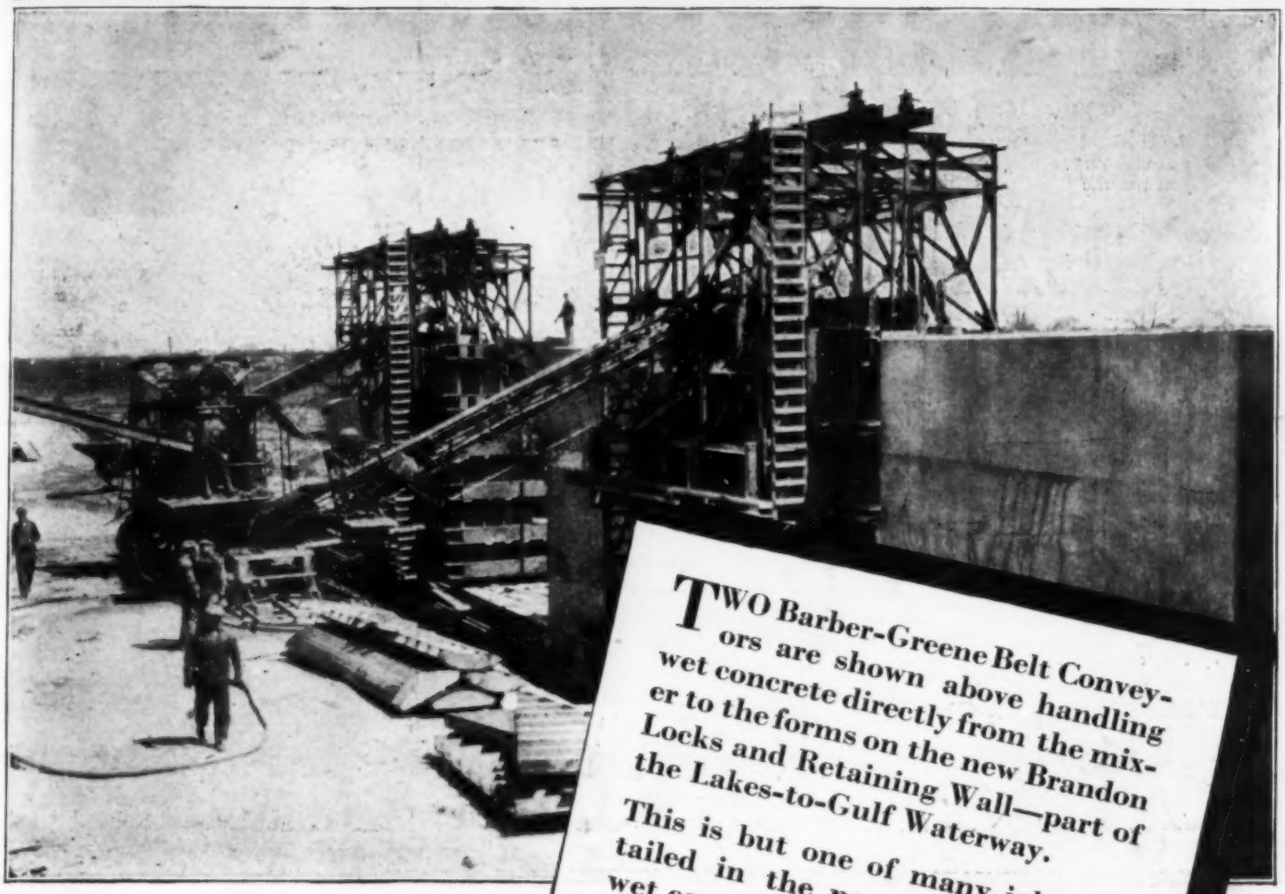

TWO Barber-Greene Belt Conveyors are shown above handling wet concrete directly from the mixer to the forms on the new Brandon Locks and Retaining Wall—part of the Lakes-to-Gulf Waterway.

This is but one of many jobs detailed in the new Barber-Greene wet concrete book—"New Applications and Set-Ups"—which shows B-G conveyors handling wet concrete on all types of construction work. Write for your copy today. It's full of new ideas to help cut building costs—through the elimination of hoists, towers, chutes, wheelers and other wet concrete handling equipment.

BARBER GREENE

A Flexible Wet Concrete Handling Set-Up

—that follows the job

Get this book with this coupon

CM-9

BARBER-GREENE CO., 530 W. Park Ave., Aurora, Ill.

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Some Scraper-full!!

Rocks—boulders—stumps—they all come up without rooting or scarifying when you use the

SLATE

ORIGINAL AUTOMATIC TRACTOR SCRAPER

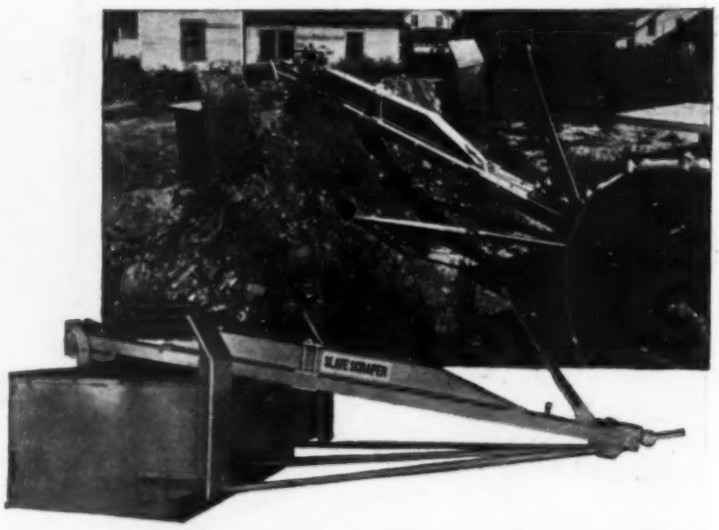
Invented and patented in 1919—and developed and perfected by 10 years actual construction work.

Does its own digging—needs no auxiliary equipment to help out.

In brief, more yardage per h.p.

STRONG. Stands up to hard work, regardless of size tractor used. Lever and hydraulically operated. All steel, riveted and welded. Operated by tractor-driver.

RELIABLE DEALERS WANTED



Write NOW for Bulletin giving full details of this remarkable, STRONG automatic dump scraper. A Western product—but will soon be used all over the country. Get full information today and cut down your "scraping" costs.

SLATE CONSTRUCTION CO., Albany, Oregon

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48 Lock Mortises cut in 3 Hours

Including face plates. Complete mortise in one operation. We will give you the contractor's name and written proof upon request. The ALTA Electric Lock Mortiser will do the same or better for you.

If electric power is not available, use our hand power mortiser. It's accurate, too.

GIVE THE ALTA A TRIAL AT OUR EXPENSE

When will you have doors ready?

WAPPAT GEAR WORKS, INC.
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STAMINA

Its ability to stand up under hard usage, no less than its correct balance and easy-handling qualities, has made this Bull Frog No. 25A a prime favorite with contractors in all types of construction work. But it is only one of many efficient Bull Frog barrows, carts and scrapers available for every mill, mine, contracting and industrial use. Our new catalog illustrates and describes them all—your request will bring a copy.

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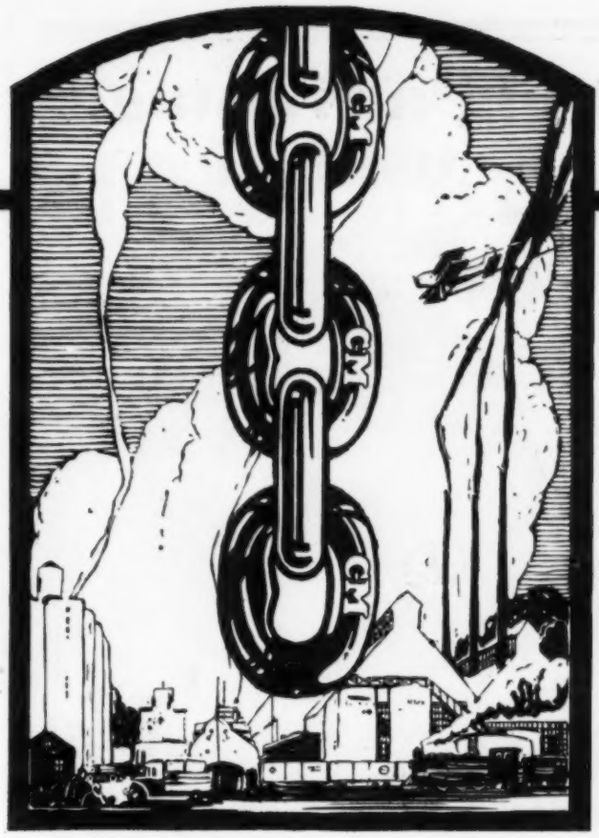
BULL FROG WHEELBARROWS

The CONSTRUCTION FIELD NEEDS "INSWELL" CHAIN



¶ *Any Chain* is no longer good enough for the construction man. He wants a chain that has proven capable of handling the job. ¶ It is the "swell" of material on the inside of the weld that signifies a stronger link and a stronger chain. At last here is a weld with extra strength. ¶ Be sure you buy "Inswell"— for your convenience the C-M brand readily identifies it. There are chains—and chains, but only one "Inswell". Remember; C-M when buying your chain.

"INSWELL" ELECTRIC WELD CHAIN

COLUMBUS-McKINNON CHAIN CO.

GENERAL SALES OFFICE: TONAWANDA, N. Y. PLANTS: TONAWANDA, N. Y. COLUMBUS, OHIO
In Canada: McKINNON-COLUMBUS CHAIN LTD., ST. CATHARINES, ONTARIO

3 big advantages using a

Starrett Stainless Steel Tape No. 520

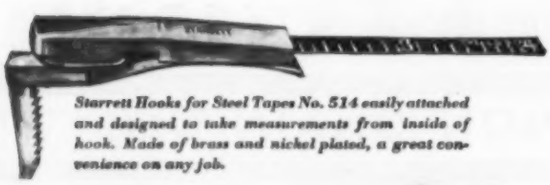
1 Will not rust or corrode in wet foundation work, around salt water, or in damp, dirty locations.

2 The quick reading Starrett feature, placing foot figures before each inch mark, prevents errors. Bright figures and graduations give constant legibility.

3 Made to give lasting service, it will lick the toughest jobs.

A complete line of steel tapes together with over 2500 Starrett Tools are described and illustrated in the Starrett Catalog No. 24 "NF". Send for a free copy, today.

THE L. S. STARRETT CO.
World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled
Steel Tapes—Standard for Accuracy
ATHOL, MASS. U. S. A.



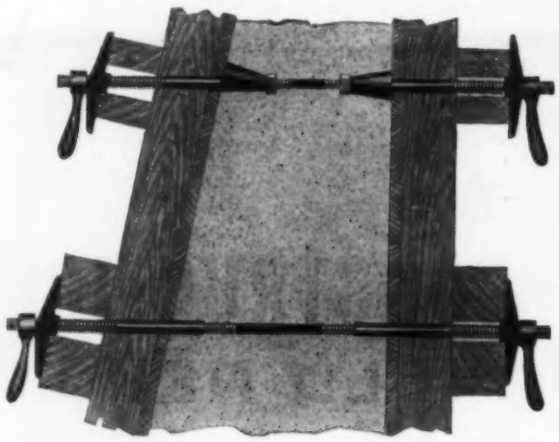
Starrett Hooks for Steel Tapes No. 514 easily attached and designed to take measurements from inside of hook. Made of brass and nickel plated, a great convenience on any job.

Use Starrett Tools

3079

WILLIAMS Form Clamps

for battered or vertical walls



Clamps may be widely spaced. Inside Rods are surprisingly cheap. Sizes 3/8-in., 1/2-in., 5/8-in. and tensile strength 7,200, 14,000, and 20,000 pounds. Labor saved in constructing and stripping forms. Clamps permit continuous pouring and give water tight walls, as no metal is left within 1-in. of the surface. Write for full particulars.

DISTRIBUTORS—There is some territory available for aggressive distributors.

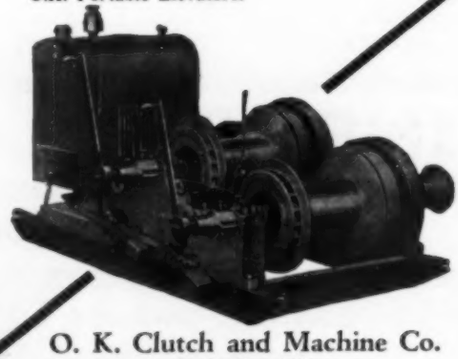
WILLIAMS CONCRETE EQUIPMENT CO.
101 Campau Avenue, Grand Rapids, Michigan

O.K. pays its way day after day

O.K. Portable Hoist

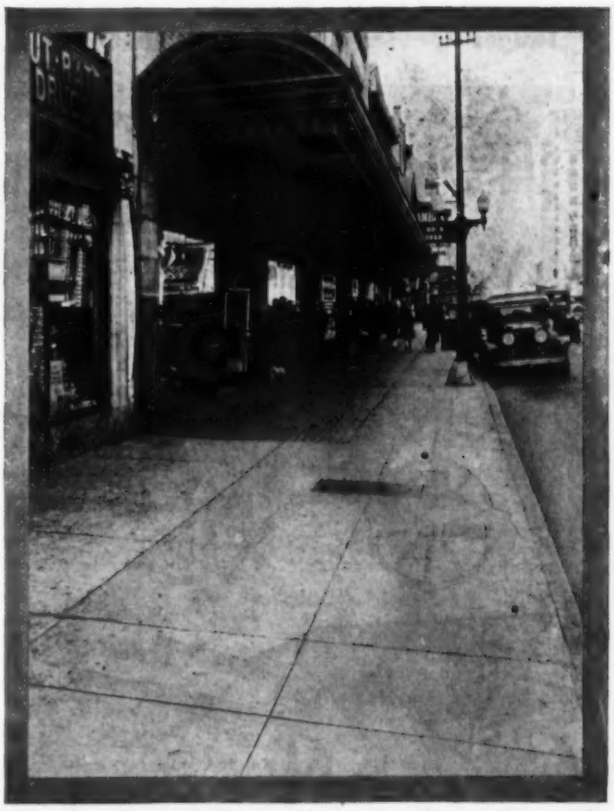
Because it does its job well, O.K. portable Hoist is given the hard tasks of loading and unloading materials; hoisting supplies; operating scrapers and drags; running portable elevators.
They have heavy engines, powerful brakes and asbestos lined double friction clutches. That's why they stand up in service.
Live agents—Write for our profitable proposition.

O.K. Air Compressors.
O.K. Portable Elevators.



O. K. Clutch and Machine Co.
P. O. Box 305
COLUMBIA, PENNA.

TIME-SAVING and GOOD-WILL



This sidewalk was laid on a Tuesday, and opened to traffic Wednesday morning. "INCOR" Cement saved traffic interruption in laying a new sidewalk.

WHEN the public has to "walk the plank" over or around newly-placed sidewalks, merchants lose money and the public is greatly inconvenienced. These delays are now wholly unnecessary. A sidewalk made with "INCOR" Brand Perfected High-Early-Strength Portland Cement, placed today, can be opened to use tomorrow morning.

The photograph above illustrates a portion of sidewalk recently laid in one of the busiest streets in Charlotte, N. C. The work was done by the Caldwell Construction Co. who laid the sidewalk on Tuesday and opened it Wednesday morning.

"INCOR" was used. It was furnished to the Tucker Kirby Company of Charlotte by The Lone Star Cement Company, Alabama.

Wherever time is an important factor it pays to specify "INCOR" Brand Cement. For the rest of the concrete work, specify LONE STAR Cement—the cement which has established a unique nation-wide record for outstanding quality and uniformity.

INTERNATIONAL CEMENT CORPORATION

342 Madison Avenue, New York

SUBSIDIARIES

LONE STAR CEMENT COMPANY ALABAMA
Birmingham, Alabama

LONE STAR CEMENT CO. INDIANA, Inc.
Indianapolis, Indiana

THE CUBAN PORTLAND CEMENT CORP.
Havana, Cuba

LONE STAR CEMENT CO. PENNSYLVANIA
Philadelphia, Pennsylvania

THE LONE STAR CEMENT CO. (KANSAS)
Kansas City

LONE STAR CEMENT CO. VIRGINIA, Inc.
Norfolk, Virginia

LONE STAR CEMENT CO. NEW YORK, Inc.
Albany, New York

LONE STAR CEMENT CO. LOUISIANA
New Orleans, Louisiana

ARGENTINE PORTLAND CEMENT CO.
Buenos Aires, Argentina

LONE STAR CEMENT COMPANY TEXAS
Dallas and Houston, Texas

URUGUAY PORTLAND CEMENT COMPANY
Montevideo, Uruguay

One of the world's largest cement producers—13 mills... total annual capacity 21,000,000 bbls.

ACCEPT NO SUBSTITUTE

Sterling

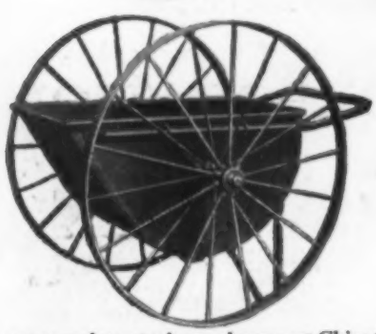
—"self-lubricating" axle bearing—
***guaranteed for the barrow's life*—means**
longer service and easier wheeling.

No. 6A—A.G.C. *for* dry material. Capacity 3½ cu.ft. *All Sterling barrows have reinforced tray tops and corners.* This is the most popular general type barrow.

No. 31—large concrete or wet material. Capacity 4 cu.ft. struck. *The easiest wheeling big load barrow made.* Will outlast others in toughest work.

No. 10A—wide tray, capacity, 4½ cu.ft. A.G.C. standard. Fits all contracting requirements and *built to give the longest service.* Solid and strong.

No. 61—extra narrow deep tray, capacity 3½ cu.ft. for concrete, mortar, etc. A type that will cost you *less to use* because it will last longer.

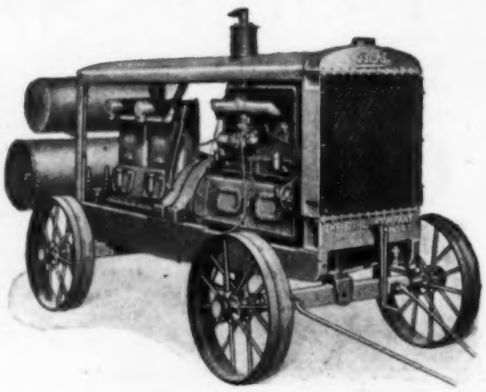


No. 6—the *strongest built cart* on the market. Full capacity body, no axle inside. Capacity 6 cu.ft. or 1200 lbs. Perfect balance and easiest wheeling. 42-in. wheels.

The above is but a few of the many, many Sterling types — write for complete catalog. Buy by Sterling name — leading hardware and equipment dealers have them or they can get them quickly from our complete stock warehouses at Chicago, New York, Philadelphia Pittsburgh, Cleveland, Detroit, St. Louis.

STERLING WHEELBARROW COMPANY
STERLING ON A WHEELBARROW MEANS MORE THAN STERLING ON SILVER
Milwaukee Wisconsin

BUHL COMPRESSORS
Have No Equal for Economy



USERS everywhere are producing compressed air at a less cost than ever before. The many advanced features of the BUHL Portable Compressor, obtainable on no other machine mean *less cost* for *operation, longer life,* and *freedom from expensive shutdowns.*

Write for Descriptive Bulletins

The *Buhl* Company

Old Colony Bldg., CHICAGO

Don't Overlook Opportunities

Men who regularly keep in touch with the market through other channels often overlook the many opportunities that are to be found in the

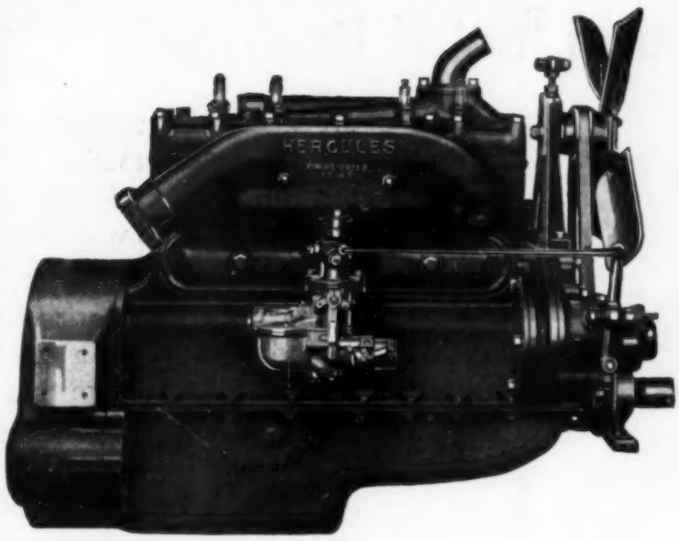
SEARCHLIGHT SECTION

For Every Business Want

"Think* SEARCHLIGHT *First"

0156

HERCULES ENGINES



THE "OO" SERIES

For heavy duty requirements in the lower horse power ranges, manufacturers of power equipment are finding that the Hercules "OO" Series 4-cylinder models are ideally suited to their needs.

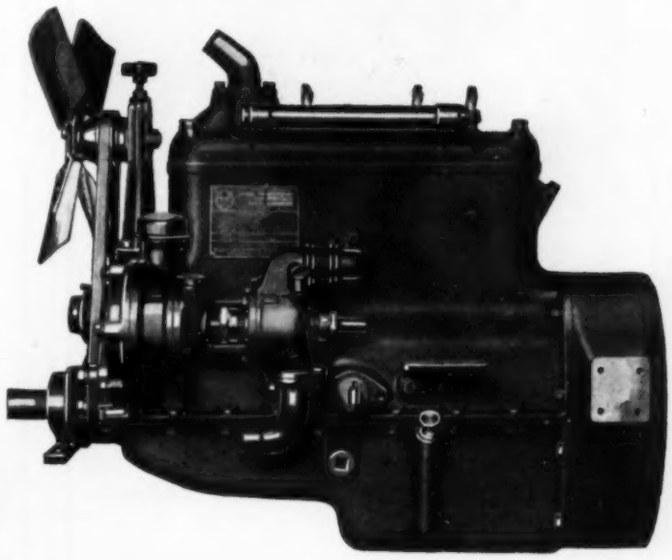
Simple and compact in design and sturdy in construction, the "OO" Series Engines embody the characteristics of the famous Hercules "OX" Series models, of which they are smaller counterparts.

Provision for all accessories is included —for Hercules "OO" Series Engines are not designed for a single purpose, but are completely developed for universal application.

The ALL-AROUND SUPERIORITY for which Hercules Engines are noted is well exemplified in the "OO" Series models. Write for complete and detailed information.

SPECIFICATIONS

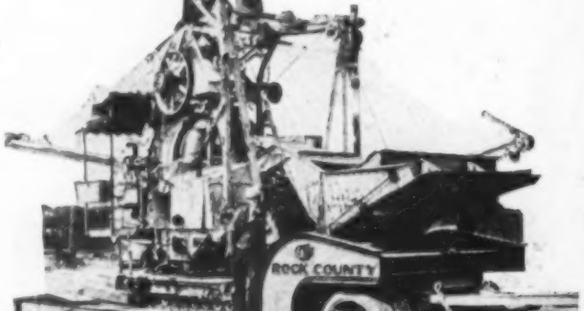
Model	No. of Cyl.	Bore	Stroke
OOA	4	3½"	4½"
OOB	4	3¾"	4½"
OOC	4	4"	4½"



HERCULES MOTORS CORPORATION
Canton, Ohio, U. S. A.

WEST COAST BRANCH: LOS ANGELES, CAL.
MID-CONTINENT BRANCH: TULSA, OKLA.

WHAT Do You Have to Move?
WHAT Is Your Line of Business?



IF YOU are a contractor and will furnish the above information we will advise just which Roger Trailer is adapted for handling your work with satisfaction and a definite saving.

If you are a moving contractor we'll show you how to establish in a most satisfactory business free from cut-throat competition and capable of paying a very nice profit.

Write for catalog 28.

There is a Rogers Trailer for Every Heavy Duty Service

ROGERS TRAILER

Rogers Brothers Corporation
106 Orchard St.
Albion, Penna.

TOLEDO TORCHES

The harder it blows the better they burn

Toledo Torches have established a reputation . . . for dependable performance at low cost, that is unequalled by any other safety light made.

Sold by equipment dealers everywhere!

The
Toledo Pressed Steel Company
Toledo · Ohio

BAKER MANEY
Self Loading Scrapers

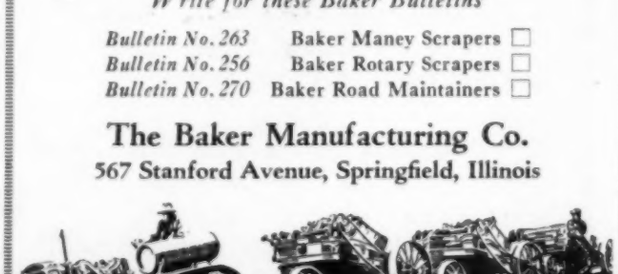
The original self-loading scrapers continue to show their ability to move large quantities of dirt with two or three men. They dig, load, haul, dump and compact the dirt as a single outfit.

They are available in three sizes—¾, 1 and 1½ cubic yard capacities to suit your job or your tractor.

Write for these Baker Bulletins

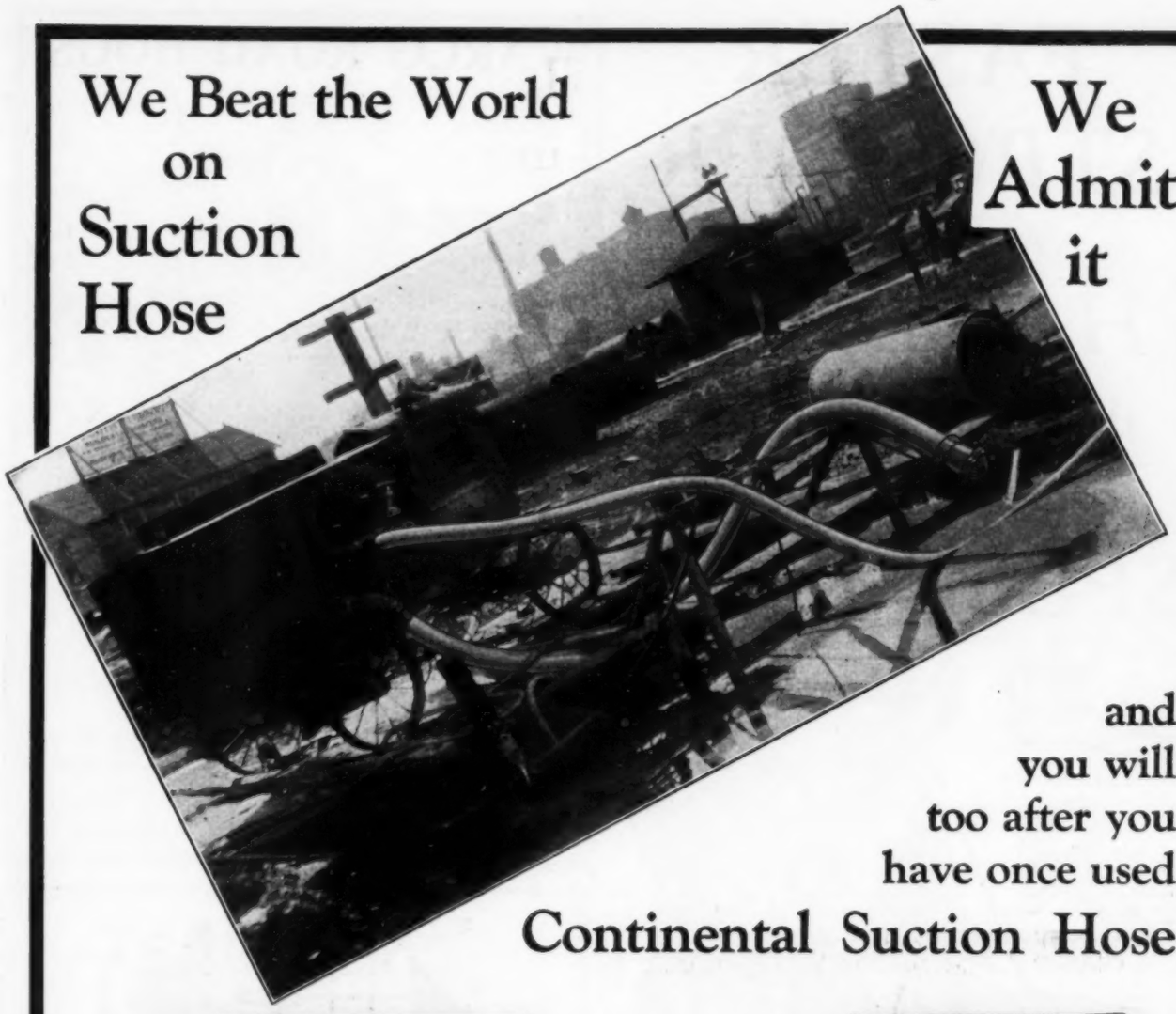
Bulletin No. 263	Baker Maney Scrapers ☐
Bulletin No. 256	Baker Rotary Scrapers ☐
Bulletin No. 270	Baker Road Maintainers ☐

The Baker Manufacturing Co.
567 Stanford Avenue, Springfield, Illinois



We Beat the World on Suction Hose

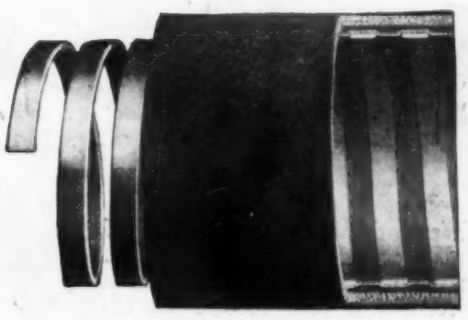
We Admit it



and
you will
too after you
have once used

Continental Suction Hose

Smooth Bore



Rough Bore

Write the Branch nearest you for prices and information

BRANCHES

Baltimore	Boston	Buffalo	Chicago	Cleveland
Dayton	Detroit	Milwaukee	New York	Philadelphia
	Pittsburgh	St. Louis	Toledo	

Continental Rubber Works - Erie, Pa.

Chas. C. Kerner, 152 Chambers St., New York, Exclusive Foreign Representative.

FASTER STRONGER ALL-AROUND HANDIER-

this End Discharge One Bag Trailer-

SPEED KING

Jaeger One-Bag Timken Bearing Tilter—Usual ½ Bag Price!

Here's the mixer that's smashed all records in the one-bag field for performance and for sales. Within a year it outsold *all others*—showed contractors a new idea of speed and all 'round handiness on the job and getting to the job.

Speed King does the work of a side discharge mixer and more. Can be used like a paver. And because it's a Jaeger it gets quick service everywhere.

LOW PRICE—EASY TERMS—MAIL SLIP

THE JAEGER MACHINE CO. Date_____
800 Dublin Ave., Columbus, O.

Send catalog, prices and terms on

☐ *Non-Tilters* 7, 10, 14, 21, 28 ft. ☐ *Plaster Mixers* 1 and 2 Bag ☐ *Tilters* 3½, 5, 7, 10, 14 ft.

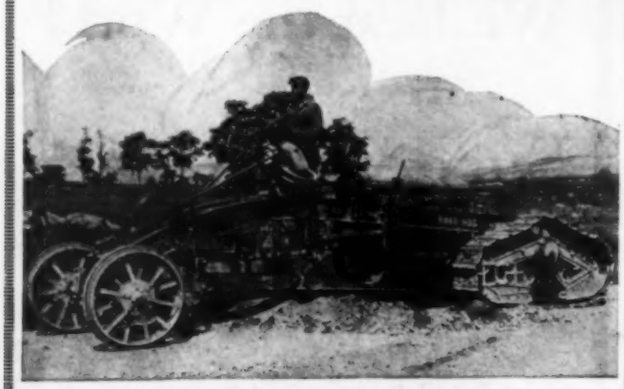
☐ *Contractors Pumps—Towers—Hoists*

(Check where interested)

Name_____

Address_____

WARCO ROAD HOGS



unlike other road hogs, are very popular. The WARCO Road Hog grader does not require the middle of the road. It can work along the road edge, keep ditches open, the road surface smooth, and free from ruts or bumps.

Ask for our new Road Machinery Catalog—just off the press.

W. A. RIDDELL COMPANY

BUCYRUS OHIO

Graders, Rollers, Wheeled Scoops, Rear Crawlers

Does Not Harden or "Set"

Dixon's Pipe Joint Compound makes absolutely tight joints, but does not harden or "set."

This permits joints to be opened easily at any time—saves labor, fittings and tools.

One pound is equal to about four pounds of red or white lead, and is therefore less expensive.

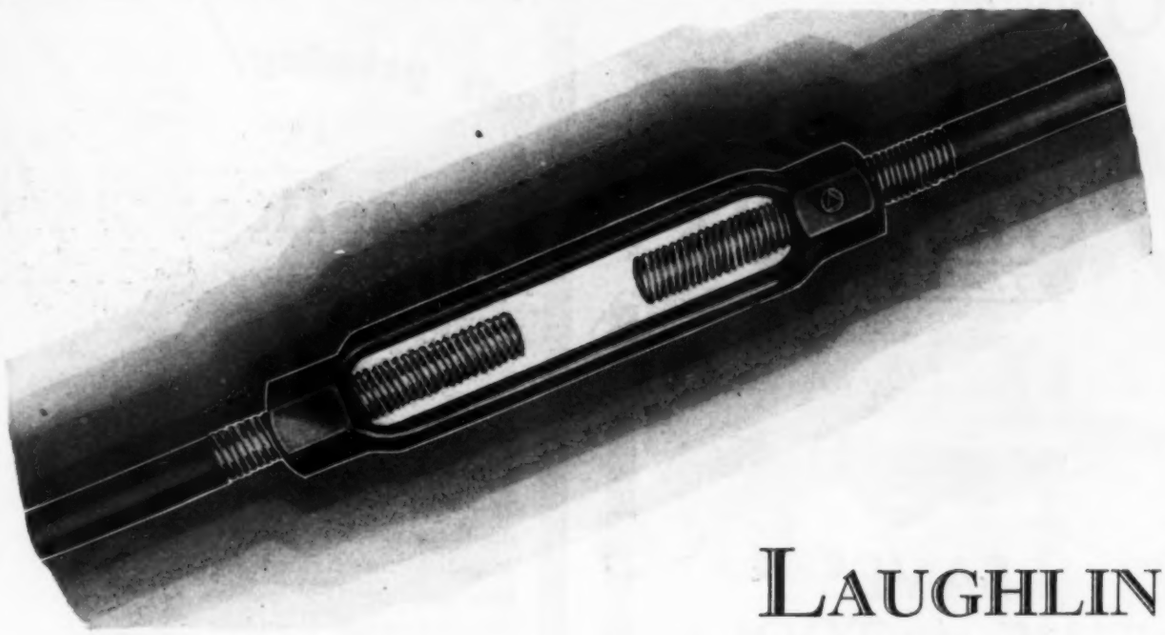
Use it on either screwed or flanged joints; for steam, water, gas or oil. Also on bolts and nuts.

DIXON'S PIPE-JOINT COMPOUND

JOSEPH DIXON CRUCIBLE CO.

JERSEY CITY NEW JERSEY

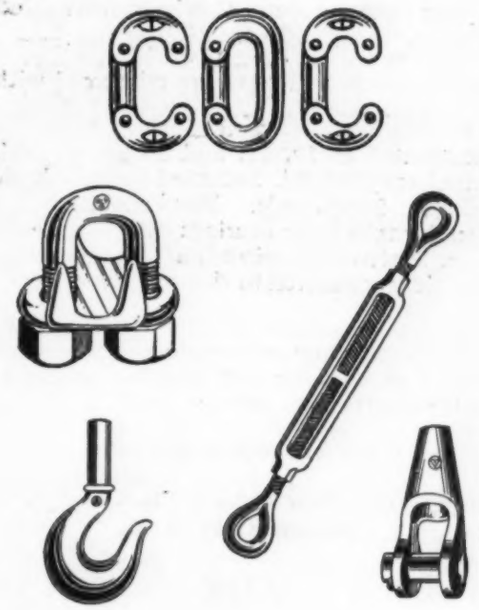
Established 1827



LAUGHLIN
Weldless Turnbuckles—

HEX ENDS—FULL THREAD

THE great strength and sixty year old reputation of Laughlin turnbuckles make them safer. Your insurance? The Laughlin trademark. Send for catalog.



TRADE MARK

THE THOMAS LAUGHLIN CO.

PORTLAND, MAINE

Wire-Rope Fittings - *Drop Forgings* - *Marine Hardware*

NEW YORK - CHICAGO - SAN FRANCISCO - SEATTLE - LOS ANGELES

NOW *The* MOHAWK HI-SPEED TRAILER

TRADE-MARK

SAVES TIME AND TOOLS

The Mohawk Hi-Speed Trailer Tool Box is designed for the convenience of the progressive Contractor. Made of heavy sheet steel, all seams electrically welded. Has double covers which are waterproof and can be locked down, preventing loss of tools by theft. Double reinforced bottom and edges. Inside has a sliding tray for small tools, etc. Can be trailed behind the truck at high speed.

Inside bottom and top edge reinforced with angle iron.

Constructed of 10, 12, and 14 gauge steel. Extra heavy welded. Mounted on half elliptic springs. 2-inch axle. Firestone tires and special length roller bearings with alemite fittings. Positive non-slip adjustable supporting leg rigidly connected to channel frame.

Size of tool compartment: 7 ft. long, 3 ft. wide, and 2 ft. high, with sliding tray for small tools, 1 ft. wide by 7 ft. long, adjustable to center or either side of box.

Write for complete data today

MOHAWK ASPHALT HEATER CO.
Schenectady, N. Y.

FOR

Speed
Security
Strength
Rugged Construction

Self priming!

Homelite

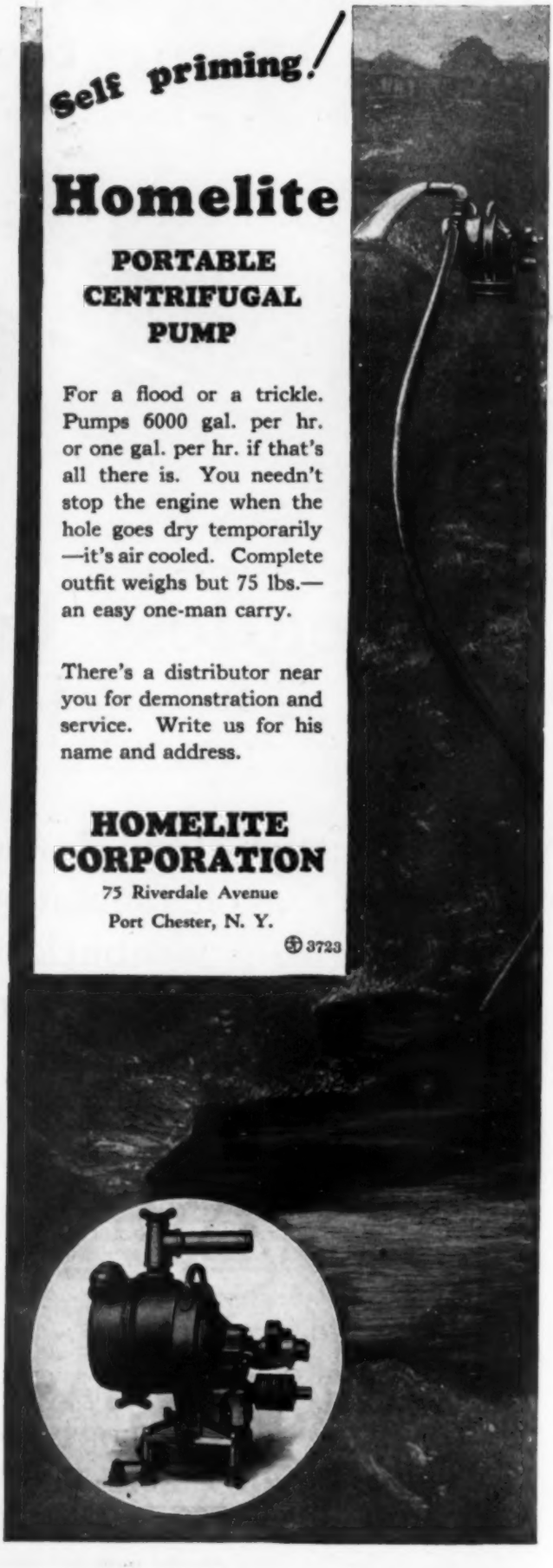
PORTABLE CENTRIFUGAL PUMP

For a flood or a trickle. Pumps 6000 gal. per hr. or one gal. per hr. if that's all there is. You needn't stop the engine when the hole goes dry temporarily —it's air cooled. Complete outfit weighs but 75 lbs.— an easy one-man carry.

There's a distributor near you for demonstration and service. Write us for his name and address.

HOMELITE CORPORATION
75 Riverdale Avenue
Port Chester, N. Y.

3723



Who's Getting the Big Contracts?

A Monthly Guide to Where the Construction Dollar is Being Spent

Far West

Seattle, Wash.
Bridge: Est. $750,000
J. M. Clapp, Seattle.

Santa Ana, Calif.
Factory: $4,000,000
Stone & Webster, Los Angeles.

Long Beach, Calif.
Office: $300,000
Saleh Bros., Los Angeles.

Clyde, Calif.
Dam: $800,000
H. W. Rohly, San Francisco.

Stockton, Calif.
Cement Plant: $1,400,000
MacDonald Engr. Co.

Los Angeles, Calif.
Apartment: $1,000,000
J. W. Forderer, Los Angeles.

Seattle, Wash.
Waterworks: $527,027
J. L. Smith Constr. Co., Seattle.

West of Mississippi

Minneapolis, Minn.
Grain Elevator: $300,000
Fegles Constr. Co., Minneapolis.

St. Paul, Minn.
Viaduct, Etc.: $856,787
Thornton Bros. Co., St. Paul.

Iowa
Railroad, Etc.: $1,000,000
John Marsch Inc., Chicago.

Cedar Rapids, Iowa
Waterworks: $500,000
Stark Constr. Co., Cedar Rapids.

Galveston, Tex.
Grain Elevator: $2,000,000
Galveston Wharf Co., Galveston.

Oklahoma City, Okla.
Historical: $412,200
Holmboe Constr. Co., Okla. City.

Middle West

Cleveland, O.
Club: $2,300,000
Thompson-Starrett Co., New York.

Canton, O.
Hotel: $600,000
H. L. Stevens Co., Chicago.

Ashtabula, O.
Power Plant: Est. $11,000,000
Hunkin-Conkey Constr. Co., Cleveland.

Toledo, O.
Bank: $3,000,000
A. Bentley & Sons Co., Toledo.

Chicago, Ill.
Store and Office: Est. $2,500,000
McLennan Constr. Co., Chicago.

Chicago, Ill.
Junior High School: $1,136,227
W. E. O'Neil Constr. Co., Et al., Chicago.

Chicago, Ill.
Office: $8,000,000
O. W. Rosenthal-Cornell Co., Chicago.

Chicago, Ill.
Apartment: $1,200,000
H. Janisch & Co., Chicago.

Chicago, Ill.
Apartment: $2,000,000
C. E. Erickson, Chicago.

Chicago, Ill.
Apartment: $1,500,000
Fleisher Engr. & Constr. Co., Chicago.

St. Louis, Mo.
Apartment: $1,250,000
H. C. Felton, St. Louis.

Webster Groves, Mo.
Seminary: $1,250,000
Mississippi Valley Constr. Co., St. Louis.

Missouri
Dikes: Est. $1,898,927
A. W. Farney
Massman Constr. Co., Et al., Kansas City.

Lansing, Mich.
Power Plant, $750,000
H. G. Christman Co., Lansing.

Rockford, Ill.
Factory: $750,000
Security Building Co., Rockford.

Barrington, Ill.
Factory: $1,000,000
Lundorff-Becknell Co., Chicago.

Ft. Wayne, Ind.
Bank: $1,000,000
Buesching & Hagerman Co., Ft. Wayne.

Grosse Point, Mich.
Sewer, $415,000
S. A. Healy, Detroit.

Detroit, Mich.
Airport: $609,500
W. E. Wood Co., Detroit.

Detroit, Mich.
Filtration Plant, $1,572,898
W. E. Wood Co., Detroit.

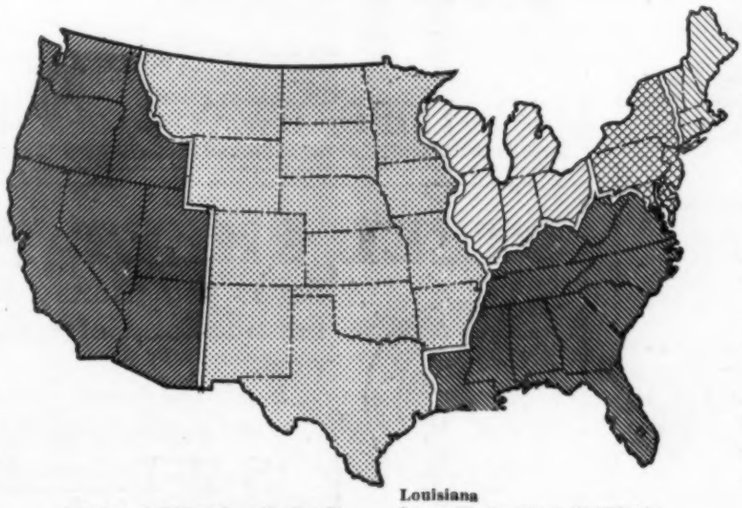
South

Atlanta, Ga.
Bank: $750,000
Barge Thompson Co., Atlanta.

Atlanta, Ga.
Hospital: $412,600
A. Blair, Montgomery, Ala.

Atlanta, Ga.
Prison: $250,000
Dept. Justice, c/o W. T. Haumack, Asst. Supt. Prisons.

West Point, Ga.
Hydro Electric Project, $10,500,000
Hardaway Contg. Co., Atlanta.



Louisiana
Levee Work: Total $1,786,940
J. J. McCoughey Co., States Constr. Co., Chicago, Ill.

Middle Atlantic

Burlington, N. J.
Bridge: $1,000,000
McClintock Marshall Co., Pittsburgh, Pa.

Jersey City, N. J.
Bridge: $2,841,000
Bethlehem Steel Co., Et al.

Atlantic City, N. J.
Hotel: $1,000,000
Day & Zimmermann, Phila.

Washington, D. C.
Church: $1,750,000
G. A. Fuller Co., Washington.

Baltimore, Md.
Airport: $3,000,000
Stone & Webster, Inc., New York.

Phila., Pa.
Office: $3,000,000
Wark Co., Phila.

Port Chester, N. Y.
Hospital: $1,600,000
W. L. Crow Constr. Co., New York.

Brooklyn, N. Y.
Subway: $4,654,052
Del Balso Constr. Co., New York.

Long Island City, N. Y.
Subway: $4,882,705
G. W. Flynn, New York.

Valley Stream, N. Y.
Airport, $3,000,000
Stone & Webster, Inc., New York.

Atlantic City, N. J.
Bank: $4,000,000
G. A. Fuller Co., New York.

New York, N. Y.
Apartment: $2,500,000
H. R. H. Constr. Co., New York.

New York, N. Y.
Loft: $1,000,000
W. Ginsberg, New York.

New York, N. Y.
Bank: $4,000,000
G. A. Fuller Co., New York.

New York, N. Y.
Office: $50,000,000
Channin Constr. Co., New York.

New York, N. Y.
Apartment: $6,000,000
Henry Mandel Bldg. Co., New York.

North Tarrytown, N. Y.
Factory
J. W. Cowper Co., Inc., Buffalo.

Pittsburgh, Pa.
Airport: $500,000
Stone & Webster, Inc., New York.

Fredericksburg, Va.
Paper Plant: $1,000,000
Hughes-Foulkrod Co., Phila.

South Charleston, W. Va.
Plant: $1,000,000
H. K. Ferguson Co., Cleveland, O.

Atlantic City, N. J.
Hotel: $1,000,000
Goudos Co., Reading, Pa.

Pittsburgh, Pa.
Hospital: $750,000
Stone & Webster, Inc., Pittsburgh.

New York, N. Y.
Hospital: $5,000,000
Hegeman-Harris Co., New York.

New England

Wellesley, Mass.
College Building: Est. $1,000,000
L. D. Willcut & Sons Co.

Boston, Mass.
Bridge: $757,354
Coleman Bros., Boston.

Bridgeport, Conn.
Factory: $350,000
Edward Bray Co., Bridgeport

Providence, R. I.
School: $1,159,615
E. Turgeon, New York.

SEARCHLIGHT SECTION

EMPLOYMENT—BUSINESS OPPORTUNITIES—EQUIPMENT

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 5 cents a word, minimum $1.00 an insertion, payable in advance.

Positions Vacant and all other classifications, 10 cents a word, minimum charge $2.00.

Proposals, 50 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals.)

DISPLAYED—RATE PER INCH:

1 inch $7.50
2 to 3 inches..... 7.25 an inch
4 to 7 inches..... 7.00 an inch

An Advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

C.M.

POSITION VACANT

SUPERINTENDENTS of construction, engaged entirely in heavy construction work, experienced in hydro-electric construction, concrete and earth dams, power houses, rock excavations, etc. If you are open for a position of this description, advertise in the Searchlight Section of Construction Methods. Send your ad to the Searchlight Dept. Tenth Ave. at 36th St., New York.

FREE BULLETIN

ZELNICKER in St. Louis (Walter A. Zelnicker Supply Co., 511 Locust St.). 32 page Bulletin listing a large variety of items, new and used at bargain prices, ranging from steel bar stock to steel buildings, including materials and special equipment for many kinds of industrial plants, railroad, construction, mining and power work.

Stockholders and Mailing

LISTS

For Security Distribution

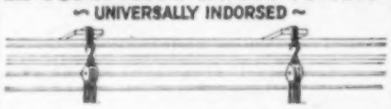
Corrected regularly—Sold with a guarantee

ASK FOR CATALOG

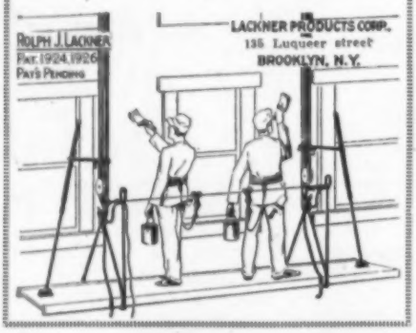
American Mailing Service, Inc.
225 Varick St., N. Y. C.

LACKNER ROPE-SCAFFOLD SAFETY SYSTEM

~ UNIVERSALLY INDORSED ~



In 33 states laws call for the use of our Scaffold Safety System. It prevents fatal accidents to building workers, reduces insurance rates and production costs. It is a monopoly, tested and endorsed by the trade. **Offers an unusual opportunity for the investor in distributing company now forming.** Will stand any investigation. Full information on request. Address



STEEL SHEET PILING

Bought, Sold, Rented.

WEMLINGER INC.

Service, Technical advice, Stocks on hand everywhere.

149 BROADWAY NEW YORK

STEEL SHEET PILING

LINDHEIMER — SUCCESSFUL PERFORMANCE FOR AGGREGATE DEPENDENCE — SERVICE

Saves you money and trouble in Foundation, Cofferdam, and Sewer work.

Bought-Sold-Rented—Always carried in stock

LONG DISTANCE TELEPHONE: CENTRAL 0491

S·W·LINDHEIMER, Inc
31 South Clarke St. CHICAGO

GREENSPON'S

ODEE Pipe for gas lines—factory-welded into double lengths, to cut field welding. Plain end and threaded pipe, with or without couplings. Casing in all sizes. *All ready for immediate Shipment from strategic centers.*

Jos. GREENSPON'S Sons
IRON & STEEL CO.
ST. LOUIS NEW YORK CITY
TULSA BORGER, TEX.
WHEATLAND, PA.

PIPE ·FOR ALL PURPOSES·

"Opportunity" Advertising:

Think *"SEARCHLIGHT"* First!

0100

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Sullivan truck mounted 110-ft. Portable Compressor operating Sullivan Busters to break concrete pavement for a pipe trench.

Rock Drills in Trench Excavations

Clay Spaders Tunneling Hard Clay

Speed Your Contracts with Sullivan Air Power Equipment

"On the job quickly—and the job quickly done"—becomes the motto of the contractor or municipality armed with Sullivan Equipment.

Sullivan **Vibrationless** Portable Compressors provide a trouble-free, economical compressed air supply—in convenient units, from 110 to 130 cu. ft. Steel wheels or skids for cross-country jobs, trailer or motor truck for quick moves in town.

For rock drilling, there are Sullivan Drills of a dozen types. "L-8" Rotators (39 lbs.) are popular for trench excavation and other ordinary drilling. They are light, powerful, economical of air.

For Breaking Concrete. Sullivan "K-2" (75 lbs.) and "K-4" (84 lbs.) "Busters" assure rapid work in removing the toughest pavement, without punishing your men. Busters are readily adapted to **driving sheeting** by use of a special pile hammer head.

Then there are **Sullivan Spaders** for digging clay, and Sullivan Portable Hoists for pulling cars or scrapers or hoisting buckets or plates or timbers.

We will be glad to help you speed up your working schedule. **Send for the Catalogs.**

Portable Compressors	83-F
Hammer Drills	81-S
Concrete Breakers	81V
Clay Spaders	81-N
Portable Hoists	76-F

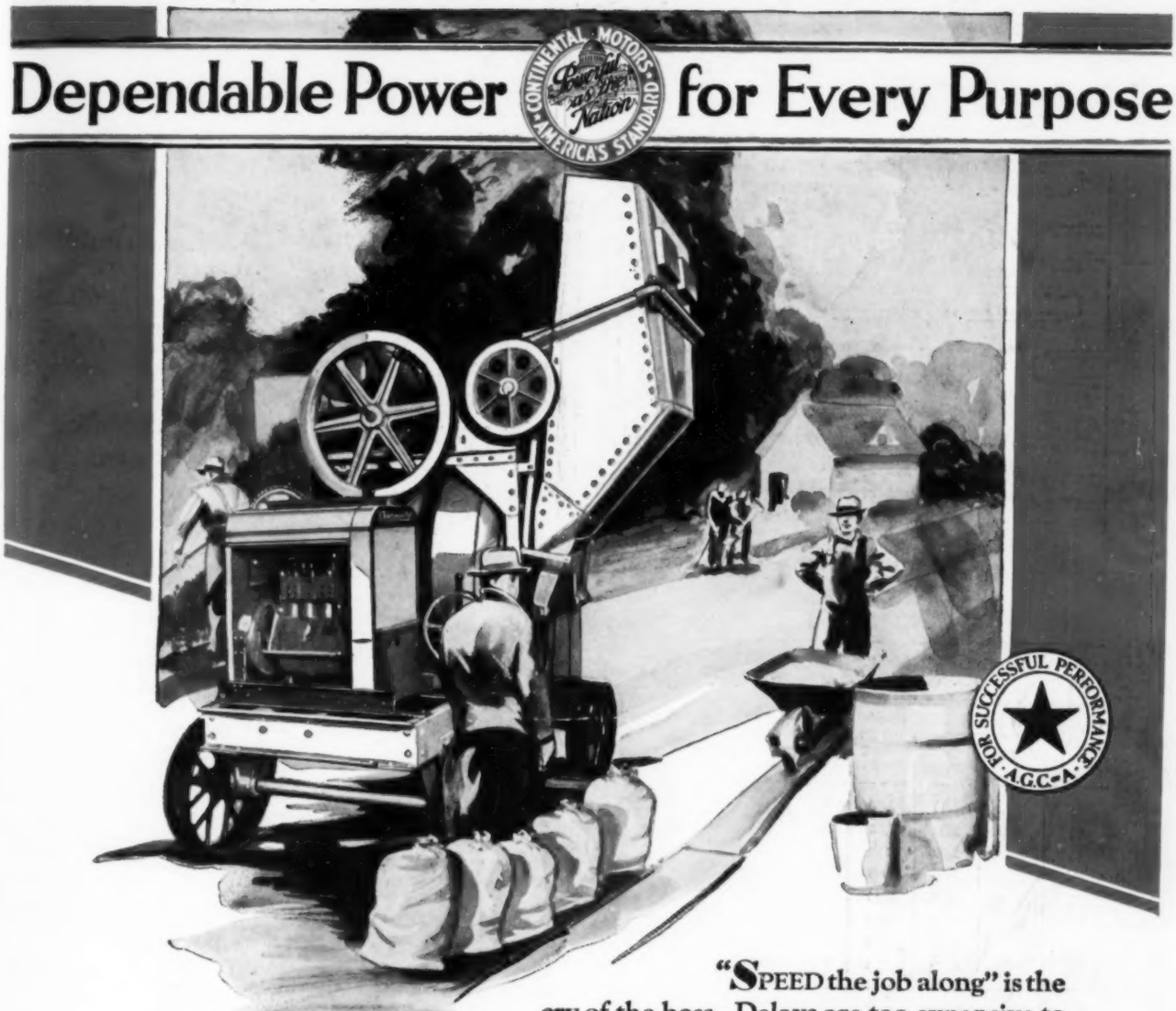
SULLIVAN TRADE MARK

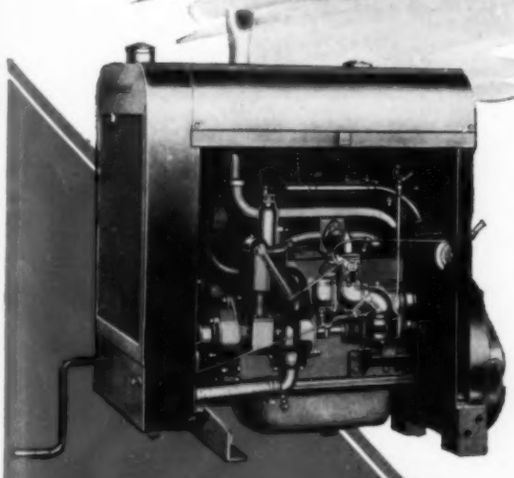
SULLIVAN MACHINERY COMPANY

816 Wrigley Bldg., Chicago

Offices in all principal cities of the world.

Dependable Power for Every Purpose

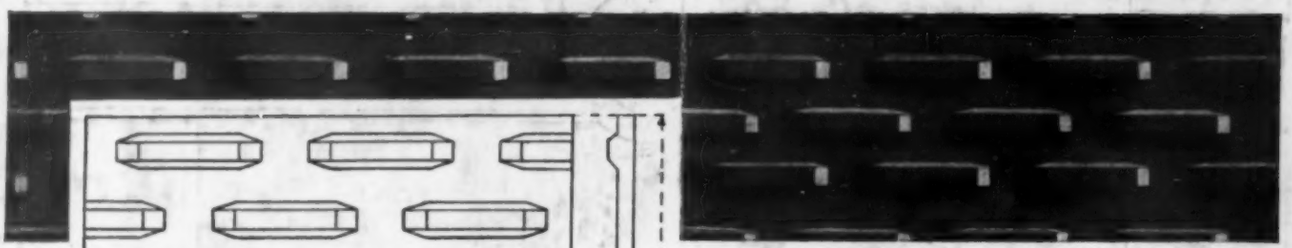


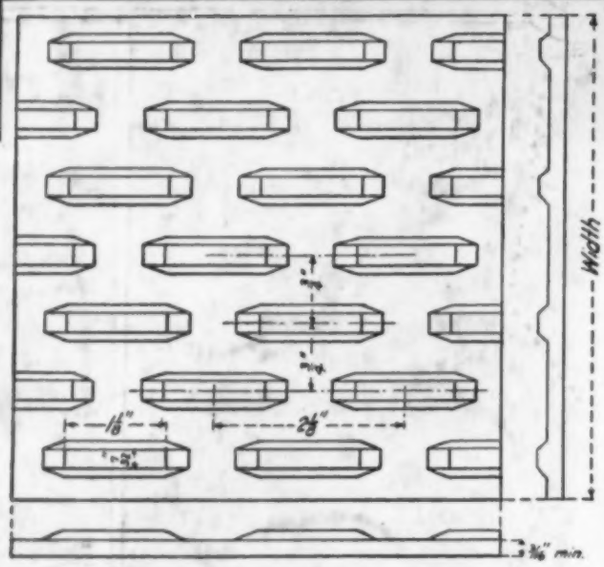


"SPEED the job along" is the cry of the boss. Delays are too expensive to countenance in road building. ¶ Among the many road building jobs where Heavy Duty Continental Engines lead the way to profits a significant number is located in Southern California. The T. L. Smith Co. 10S Mixer shown above is powered with a Heavy Duty Continental Engine applied by Brown Bevis Co. as assurance of profitable power dependability under all conditions.

CONTINENTAL MOTORS CORPORATION
INDUSTRIAL EQUIPMENT DIVISION
Office and Factory: Muskegon, Michigan
The Largest Exclusive Motor Manufacturer in the World

Continental Engines





Thickness, Inches	Width and Length, Inches						Weight per Sq. Foot, Pounds
	Over 6 to 12	Over 12 to 24	Over 24 to 36	Over 36 to 48	Over 48 to 60	Over 60 to 66	
¾	...	120	180	280	264	240	31.7
⅝	...	180	200	300	300	260	26.6
½	120	240	240	320	360	300	21.5
7/16	120	240	240	340	360	300	19.0
⅜	120	240	300	340	360	300	16.4
5/16	120	240	300	320	360	300	13.9
¼	120	240	300	320	360	240	11.3
5/16	120	240	300	320	360	240	8.8

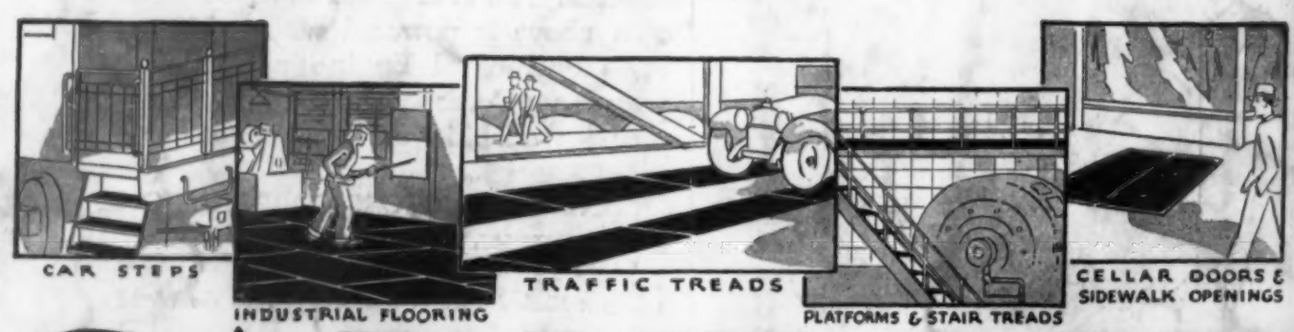
CARNEGIE Floor Plate is the improved raised pattern type, providing a sufficient raised contact area to furnish a satisfactory bearing surface and insuring longer life, comfortable walking and high resistance to slipping. The design is such that the plate drains completely and cleans easily.

Carnegie Floor Plate is recommended for boiler room and industrial flooring, stair treads, sidewalk doors and openings, traffic treads on bridges, elevated platforms and for any and all service where a safe foothold is required. This plate is offered in sizes shown on left. The long dimension of the raised figure is in the direction of rolling and the length of plate required should always correspond to this direction. The thickness of plate furnished is the thickness of the flat plate, exclusive of the height of the raised figures.

CARNEGIE STEEL COMPANY

Subsidiary of United States Steel Corporation

PITTSBURGH, PA.



CARNEGIE FLOOR PLATE